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ABSTRACT

Completed in 1982-83, this is a manual of science competencies and proficiencies for the Moorestown Public Schools, New Jersey. The document's seven major sections include: (1) a statement of philosophy of the science department stressing science education's role as the link between science, technology, and society; (2) suggested science competencies for grade 8 (including concept objectives in both life and physical science, as well as attitudinal objectives in science); (3) competencies in life science for students in grade 12; (4) competencies in physical science for students in grade 12; (5) descriptions of all high school science courses offered; (6) flow charts for student selection of science courses in grades nine through twelve; and (7) listings of specific subject proficiencies for each science course taught at the high school level. (TW)

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SCIENCE PROFICIENCIES AND COMPETENCIES

FOR STUDENTS IN GRADES EIGHT THROUGH TWELVE

MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN. NJ
1982-83

U.S. DEPARTMENT OF EDUCATION
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Dr. Edward P. Donovan
Chairperson. K-12 Science
Curriculum Committee

SE047189

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ADVANCED PLACEMENT CHEMISTRY
PHYSICS

FOREWORD

The following manual of science competencies and proficiencies was completed during the 1982-83 school year by the K-12 Grade Science Curriculum Committee and High School Science Department of Moorestown Public Schools, New Jersey. Dr. Edward P. Donovan, the committee chairperson and science supervisor, directed the completion of this work.

The manual is divided into 7 major sections. The first section is a statement of the philosophy of the Moorestown High School Science Department. The next three sections involve a listing of competencies in science for students completing 8th and 12th grade (this is divided into life science and physical science). The competencies for grade 8 includes major concepts which are divided into major life and physical science concepts. The last part of the 8th grade competencies includes the necessary process skills and affective competencies. With modification for the district, much of this was taken from: "Suggested Science Competencies for Students Completing Grades 4, 8, and 12 in Connecticut Schools" printed by the Connecticut Science Teachers Association, May, 1980.

The competencies for students completing grade 12 are also concept oriented with major objective clusters. These competencies are divided into life and physical science. Included in these lists are those competencies that we expected all 12th grade students to demonstrate 60% mastery in their senior year. Also included are general laboratory related proficiencies.

It was the intention of the committee to also develop 4th grade science competencies. Unfortunately, these were not completed before Dr. Donovan left the school district. When these competencies in science for students in grades 4, 8, and 12 were completed, the district planned on finding or developing a science achievement testing program. This way we could measure the success of our K-12 science program.

The next section includes course descriptions for all of the high school science courses. The following section includes flow charts for the different science education paths a ninth grade student could take depending upon the initial course taken.

The last section of the manual includes the specific subject proficiencies for each science course taught at the high school level in Moorestown. Included for each course is the following information: course title, number of credits (6 credits = 1 year), the date they were written, the stated proficiencies, the evaluation procedures, the evlauation of classwork, and the achievement ratings. In Moorestown, these subject proficiencies are given to each student at the beginning of a course so that the students can have a better understanding of what will be taught and expected of them.

It is hoped that this manual will be of benefit to other school systems involved in science curriculum development.

Sincerely,

Edward P. Donovan

Edward P. Donovan, Ph.D.
Director Science Education Center
University of South Carolina -
Spartanburg

September, 1986

STATEMENT OF PHILOSOPHY OF THE SCIENCE DEPARTMENT

Statement of Philosophy of the Science Department

The members of the science department at Moorestown High feel that science is an essential component in the total education process. Science education is the link between science, technology and society. The ultimate goal of the science program at Moorestown High School is to develop scientifically and technologically literate citizens, as well as to prepare students for scientific and/or technological careers.

The science department defines a scientifically and technologically literate citizen as being able to:

1. use scientific concepts, process skills, and values in making responsible everyday decisions.
2. understand how society influences science and technology as well as how science and technology influence society.
3. recognize the limitiations as well as the usefulness of science and technology in advancing human welfare.
4. explain the major concepts, hypotheses, and theories of science and is able to use them.
5. understand that the generation of scientific knowledge depends upon the inquiry process and upon conceptual theories.
6. distinguish between scientific evidence and personal opinion.
7. recognize the origin of science and understand that scientific knowledge is tentative and subject to change as evidence accumulates.
8. understand the application of technology and the decisions entailed in the use of technology.
9. find reliable sources of scientific and technological information and use these sources in the process of decision-making.
10. appreciate the worthiness of research and technological development by having sufficient knowledge and experience in the sciences.
11. appreciate science and technology for the intellectual stimulus they provide.
12. understand that society controls science and technology through the allocation of resources.
13. have a richer and more exciting view of the world as a result of science education.

In order to enable each student in our high school to become scientifically and technologically literate, while at the same time prepare interested students for careers in science and technology, the science teachers of Moorestown High School use the following methods, principles and ideas to guide our science teaching:

1. offer courses in the fundamental earth, physical and biological sciences with emphasis on basic concepts.
2. teach the scientific process and practice it in the laboratory through experimentation and manipulation of materials.
3. have all science courses be laboratory oriented so that students will develop skills in critical observation, problem solving, and decision-making.

4. emphasize performance and responsibility on the part of the student.
5. provide instruction in a wide range of science activities, skills and concepts to meet the needs of all students.
6. offer a variety of courses to educate students of differing abilities in the major scientific concepts.
7. enable students to go beyond the science learning that occurs in the classroom through directed and independent study, and science clubs.
8. encourage students to take courses in the sciences beyond the state and school minimum requirements.
9. provide information and guidance as to the vocational application and opportunities in science and technology.

SUGGESTED COMPETENCIES IN SCIENCE

FOR

STUDENTS IN GRADE EIGHT

SUGGESTED COMPETENCIES IN SCIENCE

FOR STUDENTS IN GRADE 8

In the eighth grade, the learner shall be able to find patterns in data, events, and life itself and also to:

I. CONCEPT OBJECTIVES IN SCIENCE

A. Concept Objectives in Life Science

Concept: Living things carry on life functions.

1. distinguish between living and non-living things by describing basic life processes.
2. recognize the differences in the structure and function of cells, tissues, organs, and systems.
3. explain the process of photosynthesis and its dependence upon such factors as light energy, chlorophyll, water, and carbon dioxide.
4. recognize that living organisms have life cycles -- e.g. birth to death, seed to adult plant, and metamorphoris.
5. explain the theory of evolution and how it affects living creatures.
6. distinguish among biological classification groups and list representative organisms belonging to those groups.
7. draw, label and give functions for parts of a plant cell and an animal cell.
8. demonstrate knowledge of the mechanisms used by organisms for sexual and asexual reproduction.
9. describe function of DNA.
10. explain how traits are passed on from generation to generation.

Concept: Living things and the environment are interdependent and are constantly interacting.

1. draw & describe the nitrogen cycle, water cycle, and carbon-hydrogen oxygen cycle.
2. explain how solids are formed.
3. describe the chemical and physical properties of soils.

4. given reasons for the need to conserve soil,

5. explain the factors that make soil basic to the production of food,

6. explain the predator-prey relationship,

7. define symbiosis and give examples of this relationship,

8. compare, contrast, and discuss food chains and food webs,

9. label and give functions for the basic structures found in stems, roots and leaves,

10. distinguish between herbivores, carnivores, omnivores,

11. demonstrate knowledge of the following human systems, their parts and the functions of those parts: circulatory, respiratory, digestive, reproductive, endocrine, nervous, excretory, skeletal, and muscular,

12. draw and explain the processes of mitosis and meiosis,

13. demonstrate a knowledge of the periods of geologic time and the important eras in the developments of major groups of plants and animals,

14. explain how the biotic and abiotic factors in our environment are interconnected and how they influence our life.

15. demonstrate a knowledge of contemporary problems in conservation of the resources on this planet.

B. <u>Concept Objectives in Physical Science</u>

Concept: Matter and energy are interchangeable.

1. use the Periodic Chart of the elements and explain how each element's position on the chart is related to its properties,

2. define mass and volume and distinguish between mass and volume,

3. differentiate among solids, liquids, gases and describe properties of each -- e.g. by using molecular theory,

4. define density as the relationship between mass and volume,

5. recognize that whenever there is a change of state of matter, an energy change is involved -- e.g. water to steam, etc.,

6. explain temperature in terms of the Kinetic Molecular Theory,

7. identify the three basic parts of an atom and describe their locations,

8. give examples of chemical changes,

9. define and illustrate kinetic energy,

10. give examples of the following forces: adhesion, cohesion, capillarity, surface tension, gravity, friction, and electromagnetic,

11. recognize that any form of energy may be changed into another form of energy,

12. give examples of different forms of energy,

13. identify sources of nuclear energy,

14. describe the size and shape of the earth,

15. explain the relationship between gravity and Newton's Laws,

16. explain the source of the sun's energy.

17. describe the solar system, including the moon, comets, meteors, and asteroids,

18. distinguish between atoms and molecules,

19. explain how atoms combine to form simple compounds,

20. distinguish between the processes of fission and fusion,

21. compare and contrast both the positive and negative aspects of nuclear energy,

22. identify simple machines such as the wheel and axle, wedge, screw, inclined plane and pulley,

23. define mechanical advantage and the physicist's meaning of work and explain how work is measured,

24. define machine power and how it is measured,

25. compare and contrast simple and compound machines,

26. explain the principle of a thermometer,

27. distinguish between Fahrenheit and Centigrade,

28. distinguish between a conductor and insulator,

29. explain the causes of cold fronts and warm fronts,

30. compare and contrast land breezes and sea breezes,

31. define humidity,

32. describe the measurement of relative humidity,

33. explain the cause of rain,

34. distinguish between static and current electricity,

35. explain the construction and operation of dry and wet cell batteries,

36. explain how light travels and its speed,

37. explain the relationship between frequency and color of light,

38. distinguish between reflection and refraction,

39. distinguish between transparent, translucent, and opague objects,

40. explain how convex and concave lenses bend light,

41. distinguish between sound and vibration;

42. compare the speed of sound in solids, liquids, gases, and cite reasons for the differences.

Cognitive ... Process ... Psychomotor

1. make generalizations based upon data, charts, and graphs,

2. observe events and record them as data,

3. take data and make graphs and charts from the data given,

4. interpret data and charts,

5. Communicate information organized in logical sequences,

6. use measuring devices properly,

7. use, maintain, and care for the microscope,

8. set up and describe series and parallel circuits,

9. measure, compute, & calculate using the metric system,

10. given thermometer, be able to ascertain

    a) boiling point
    b) freezing and melting points
    3) body and room temperature

11. observe appropriate laboratory safety,

12. conduct simple tests for starch, simple sugars, proteins, acids, and bases,

13. test metals recognizing that certain metals have distinct properties,

14. design and implement controls & variable factors in any "experiment",

15. recognize that laws, theories & principles are used as <u>models</u> to represent reality as agreed upon by the "scientific course",

16. develop an hypothesis from basic data and devise a method to test it,

17. state relevant scientific theories and laws as well as apply them where appropriate,

18. learn the vocabulary related to each topic under study,

19. demonstrate the ability to research a science topic in a library, develop a bibliography, and do a research paper or project in science;

20. demonstrate mathematical ability in solving arithmetic problems, ratio, and proportion problems & word problems.

III. ATTITUDINAL OBJECTIVES IN SCIENCE

<u>Affective</u>

1. appreciate that science is a way of looking at life and a part of life,

2. appreciate that science is related to the student's world,

3. based on knowledge, respect and appreciate the environment,

4. show respect and appreciation for all living organisms,

5. value open-minded curiosity,

6. demonstrate an appreciation for the interrelationship of all branches of science;

7. see the need to scrutinize a given position critically and recognize differences between positions based on opinion and those based on scientific evidence.

COMPETENCIES IN LIFE SCIENCE FOR STUDENTS IN GRADE TWELVE

COMPETENCIES IN LIFE SCIENCE FOR STUDENTS IN GRADE 12

In the twelfth grade, the student should be able to demonstrate mastery of 60% of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

BIOLOGY IS THE BRANCH OF SCIENCE WHICH STUDIES LIVING ORGANISMS

1. define the term science.
2. define the term biology.
3. describe how science concerns itself with the following processes: observation, inference, prediction, and problem-solving.
4. distinguish between quantitative and qualitative observations.
5. state and describe the steps needed to solve a problem and/or conduct a scientific experiment.
6. list a define the major divisions of biology (i.e.: Zoology, Botany, Cytology, etc.).
7. list and define the major characteristics of life.

THE CELL IS THE BASIC STRUCTURAL AND FUNCTIONAL UNIT OF LIVING THINGS.

8. identify the major organelles of the cell by drawing a diagram of the cell and labeling its parts or by labeling the structures using a diagram prepared by the teacher.
9. state the function of the major cell organelles.
10. using diagrams, determine the similarities and differences between a typical plant and animal cell.
11. distinguish between mitosis and meiosis and explain the major purpose of these processes.
12. explain the relationship between cell organelles, cells, tissues, organs, organ systems, and the organism.
13. explain the principle of homeostasis as it applies to cell function.

ALL LIVING THINGS ARE COMPOSED OF CHEMICAL SUBSTANCES.

14. distinguish between elements, compounds, atoms, molecules and mixtures.
15. state the differences between acids and bases as related to living organisms.
16. distinguish between solids, liquids and gases, and explain how the change of phase of matter is utilized by living organisms in their survival.
17. name several properties of the following inorganic elements and compounds important to life
    a. nitrogen
    b. oxygen
    c. carbon dioxide
    d. hydrogen
    e. water
    f. sulfur
    g. trace elements
18. distinguish between inorganic and organic chemicals.
19. discuss the chemical structure, properties, and functions of the following organic chemicals as related to living organisms:

a. carbohydrates - sugars and starches
b. lipids - fats, oils and waxes
c. proteins - amino acids
d. nucleic acids - DNA and RNA
e. ATP
f. vitamins

20. list and discuss the major properties and functions of enzymes and coenzymes.

LIVING THINGS REQUIRE ENERGY AND THERE MUST BE AN INTERCHANGE OF ENERGY IN A BALANCED ENVIRONMENT IF LIVING ORGANISMS ARE TO SURVIVE.

21. describe the process of photosynthesis discussing the organisms and cell structures involved, the major reactants and products, and finally the purpose.
22. describe the process of cell respiration (both aerobic and anaerobic) mentioning the organisms and cell structures involved, the major reactants and products, and finally the purpose.
23. explain the differences between photosynthesis and respiration.
24. explain the interrelationship between photosynthesis and respiration.
25. explain the similarities and differences between fermentation and aerobic respiration.
26. describe the relationship between a food chain and a food web.
27. draw several basic food chains including the basic components (producer, consumer, and decomposer) using actual organisms as examples.
28. explain the relationship between producers, consumers, and decomposers using food chains and food webs.

SCIENTIFIC EVIDENCE INDICATES THAT THE FORMS OF LIFE PRESENTLY ON EARTH HAVE EVOLVED FROM COMMON ANCESTORS AND THAT ALL LIFE FORMS ARE RELATED.

29. briefly discuss the biological history of the earth.
30. discuss the major scientific evidence supporting the Theory of Evolution. (i.e., fossils, embryology, structural similarities, etc.)
31. state the major ideas of Lamarck's Theory of Evolution.
32. define and discuss the following major ideas of Darwin's Theory of Evolution:
    a. overproduction
    b. struggle for existence
    c. variation
    d. survival of the fittest (natural selection)
    e. evolution
    f. adaptation
33. discuss how the factors such as mutation and isolation influence the evolution of species.
34. discuss the characteristics that determine differences and similarities between species.

ALL LIVING ORGANISMS CAN BE CLASSIFIED.

35. list the major principles of classification.

36. classify organisms utilizing the classification system developed by Linneaus.
37. correctly place an organism in the classification hierarchy from bacteria to man.
38. identify at least one plant form and one animal form to its genus and species using a key.
39. identify representative forms of all the major protist, plant, and animal phyla/divisions studied.

THERE IS AN EVER INCREASING ORDER OF COMPLEXITY OF STRUCTURE IN LIVING ORGANISMS.

40. from a list of animals (from amoeba to man) and plants (from algae to flowering plants), explain how these organisms carry on the following life functions (be sure to refer to specific structures found in this organism)
    a. food gathering, eating and/or food production
    b. shape and support
    c. digestion
    d. metabolism
    e. locomotion
    f. absorption
    g. circulation
    h. growth
    i. sensitivity and irritability
    j. excretion
    i. secretion
    k. reproduction

A PATTERN OF INHERITANCE CAN BE OBSERVED OVER A PERIOD OF TIME.

41. explain the differences between sexual and asexual reproduction.
42. state several examples of organisms that reproduce sexually, and several examples of those that reproduce asexually.
43. explain the roles of mitosis and of meiosis in inheritance.
44. describe the chemical nature of DNA, genes, and chromosomes, and their role in maintaining genetic continuity.
45. list the Mendelian Laws of Inheritance.
46. solve basic Mendelian Inheritance problems involving crosses with one and two traits.
47. distinguish between the phenotype and genotype of an organism.
48. read and explain a family pedigree chart.
49. name and discuss the several significant human genetic traits, and be able to distinguish between those that are dominant and those that are recessive. (i.e., blood types, Rh factor, sex-linked disorders, sex determination, etc.)

CORRECT INFORMATION ABOUT THE HUMAN BODY WILL AID THE STUDENTS IN HIS/HER DAILY LIFE.

50. explain the structure and function of the human body systems given below:
    a. integumentary
    b. skeletal
    c. muscular

d. respiratory
e. digestive
f. excretory
g. circulatory
h. lymphatic
j. endocrine
k. nervous
l. reproductive

KNOWLEDGE OF THE DYNAMICS OF ECOLOGY ARE ESSENTIAL FOR INTELLIGENT ENVIRONMENTAL PLANNING AND DECISION MAKING.

51. using examples, define an ecosystem.
52. describe the general conditions of the ecosystem in which the student lives.
53. list and desribe the major environmental factors that influence the natural history of organisms.
54. using examples, distinguish between living and non-living factors.
55. describe the adaptations that organisms use to insure their survival in their particular environment.
56. explain why organisms living in the same ecosystem have similar adaptations.
57. using examples, identify and describe a predator-prey relationship.
58. predict the influence of a given environmental change on an ecosystem

GENERAL LABORATORY AND CLASSROOM RELATED PROFICIENCIES:

G-1. dissect several representative animals, including both vertebrates and invertebrates, and identify the anatomical structures.
G-2 demonstrate a working knowledge of the proper use of biological tools.
G-3. interpret data, charts and graphs.
G-4. carry out laboratory activities and be able to explain the procedures, observations, results, and conclusions orally or in writing.
G-5. correctly perform measurements using metric instruments.
G-6. correctly maintain and care for a microscope.
G-7. correctly prepare a wet mount slide.
G-8. accurately focus a compound microscope, given a prepared slide.
G-9. demonstrate satisfactory ability in the following study skills:
    a. reading textbooks, reference books and laboratory activities.
    b. notetaking.
    c. timely completion of assignments.
    d. keeping an organized notebook.
    e. working effectively with others.
    f. disciplined work habits.
    f. following directions.
G-10. exercise the self discipline which is essential to safety in the laboratory, the development of proper classroom behavior, and the development of good work skills.

COMPETENCIES IN PHYSICAL SCIENCE FOR STUDENTS IN GRADE TWELVE

COMPETENCIES IN PHYSICAL SCIENCE FOR STUDENTS IN GRADE 12

In the twelfth grade, the student should be able to demonstrate mastery of 60% of the following competencies. Each competency should be read as "The student should be able to.....".

SCIENCE AND TOOLS OF SCIENCE

1. define science.
2. describe how science concerns itself with the following processes: observation, inference, prediction, and problem solving.
3. identify the meaning of the following terms: weight, mass, volume, force.
4. distinguish between quantitative and qualitative observations
5. state and describe the steps needed to solve a problem and/or conduct a scientific experiment.

MEASUREMENT IN SCIENCE

6. use the metric system of units for measuring mass, length, and volume.
7. use the english system of units for measuring mass, length, and volume.
8. convert units from english to metric and metric to english.
9. use scientific notation and significant figures in calculations.

THE COMPOSITION OF MATTER: ELEMENTS, COMPOUNDS, AND MIXTURES

10. describe how molecules are composed of atoms bonded together
11. given a list, distinguish between elements, compounds, and mixtures.
12. identify the symbols of "common" elements.
13. explain the relationship between atomic structure and the properties of the elements.
14. describe practical uses of the major elements, compounds and mixtures.
15. classify elements according to their properties (e.g. metals, nonmetals; solids, liquids, gases)
16. distinguish between chemical bonding in which sharing of electrons takes place and bonding in which transfer of electrons takes place.

THE NATURE AND STRUCTURE OF MATTER

17. define an ion as a charged particle and an atom as a neutral particle.
18. distinguish between atoms and molecules.

19. explain the relationship between atomic structure and the properties of the elements.
20. define what is meant by a gas, liquid, and solid in terms of the proximity and relative motion of their particles and in terms of their size and shape.
21. locate protons, neutrons, and electrons in the present model of the atom and state the charge on each.

22. explain the effect of temperature on the physical state (phase) of a substance.
23. name the major phases of matter and give examples for each.
24. describe several physical properties of a substance
25. define, measure, and/or calculate the following physical constants of substances: density, specific gravity, boiling point, melting point, freezing point.
26. draw a diagram of an atom showing the relationship between the nucleus, shells, electrons, protons, and neutrons.
27. use the periodic table to determine the atomic structure, physical and chemical properties of an element.

GAS LAWS

28. explain the relationship between molecular motion and pressure.
29. predict the effect of a temperature change and pressure change on the volume of a gas.
30. solve simple problems using Charles's and Boyles's gas laws.
31. read a barometer to determine atmospheric pressure.
32. explain the process of diffusion.
33. identify supporting evidence for the kinetic theory of gases.
34. describe what is meant by STP.
35. describe some practical uses of the gas laws (e.g.- pneumatic devices).

COMPOUNDS-INORGANIC AND ORGANIC

36. distingusih between simple organic compounds and inorganic compounds.
37. write and identify the chemical formulas for the major inorganic and organic compounds.
38. determine the formula weight of a compound.
39. determine the percent of composition of elements in a compound.
40. discuss the properties of plastics, rubber, synthetic fibers and natural fibers.

THE REACTIONS OF MATTER

41. substantiate that chemical reactions result in new substances with new properties.

42. compare and contrast a physical and chemical change and explain the differences.
43. explain why and how the total mass of reactants must equal total mass of products in ordinary chemical reactions.
44. substantiate that chemical reactions are accompanied by energy changes.
45. describe the factors that effect a chemical reaction.
46. demonstrate the skill in the writing of chemical symbols, formulas and equations.
47. explain the importance and meaning of the laws of definite proportions and the of conservation of matter and energy.
48. balance simple chemical equations.
49. identify simple chemical reactions as to their type using the following classification: synthesis, decomposition, single replacement, double replacement.

ACIDS, BASES AND SALTS

50. describe general properties of acids, alkalis (bases), and salts and describe neutralization.
51. use chemical indicators and pH to determine whether a substance is acidic, basic, or a salt.
52. name some examples of common substances which are acids, bases, and salts.

MIXTURES OF MATTER: SUSPENSIONS AND EMALSIONS

53. define suspension and name several examples.
54. define emalsion and name examples.

MIXTURES OF MATTER: SOLUTIONS

55. given a solution identify the solute and solvent.
56. define the following terms: solute, solvent, solution, solubility, crystal, electrolyte , and ion.
57. discuss the major properties of water, suggesting reasons for each property.
58. name and discuss the major factors effecting solutions.
59. distinguish between dilute and concentrated solutions.
60. distinguish between saturated, unsaturated, and supersaturated solutions.
61. describe the effect of additives on the boiling point, vapor pressure, and freezing point of solutions (e.g. batteries, automobile antifreeze, rock salt on ice, etc.)

ENERGY

62. given a series of situations, determine which ones represent kinetic energy and which represent potential energy.

63. substantiate that chemical reactions are accompanied by energy changes.
64. cite evidence that energy can be converted from one form to another, but never lost or gained (in ordinary circumstances).
65. distinguish between potential and kinetic energy.
66. name the major forms of energy (e.g. light, heat, etc.).

STATIC ELECTRICITY

67. describe the nature of static electricity.
68. demonstrate how objects can be charged by contact and induction.
69. relate simple static changes to modern-day electrostatic devices (e.g.: capacitor, xerox machine, electrostatic precipitators, etc.)

ELECTRICAL ENERGY

70. define electricity and explain the differences between static electricity, and AC and DC.
71. distinguish between an electric motor and generator and explain the operation of each in simple terms.
72. distinguish between coductors and insulators and give several examples of each.
73. explain the structure and function of a battery (dry or wet cell)
74. draw a simple electrical circuit which includes a power supply, a switch, an appliance and wire.
75. define ohm, volt, and ampere.
76. solve simple problems using Ohm's Law.
77. distinguish between parallel and series circuits.

MAGNETISM

78. discuss the law of magnetic poles.
79. draw the magnetic field of a typical bar magnet.
80. differentiate between the magnetic forces of attraction and repulsion.
81. draw a diagram representing the magnetic field of the earth.

ELECTROMAGNETISM

82. make an electromagnet if given an insulated wire, iron rod, and dry cell and demonstrate its ability to attract iron objects.
83. name several uses of electromagnets (e.g.: electric bell, electric motor, generator, telephone, etc.)

ELECTRONICS

84. describe how radio waves are broadcast.
85. distinguish between AM and FM radio.
86. describe the basic operation of a microcomputer.
87. describe how a transitor works.
88. distinguish between solid state and vacuum tube electronic systems.
89. describe the basic operation of television and radio.

SOUND ENERGY

90. describe how sounds are produced, transmitted, amplified, measured, and sensed.
91. describe the relationship between the speed of sound and the nature of the medium it is traveling through.
92. define the following characteristics of sound waves: pitch, amplitude, frequency and wavelength.
93. distinguish between the characteristic wave patterns for noise and regular sounds (e.g.: music).
94. explain how an echo is created.

HEAT ENERGY

95. explain the relationship between molecular motion and heat.
96. explain the difference between temperature and heat.
97. explain the relationship between the quantity of material and the heat content of the substance.
98. explain the phase change associated with the melting point and the boiling point of a substance.
99. substantiate that chemical reactions are accompanied by energy changes.
100. describe heat as a form of energy.
101. explain how heat causes matter to expand and contract.
102. explain how heat is transferred by conduction, convection, and radiation.
103. relate the concept of heat transfer to the present energy crisis.

LIGHT ENERGY

104. discuss electromagnetic radiation.
105. make a sketch of a wave, indicate on the sketch the wavelength and amplitude, and explain what frequency is.
106. describe the wave and particle nature of light.
107. distinguish between the reflection, absorption and refraction of light waves.
108. describe how a shadow is formed and the properties of the shadow.
109. describe the effect of concave, convex and plane mirrors on the reflection of light and the formation of images.
110. describe the properties of convex and concave lenses and

their affect on image formation.

111. describe how a prism affects white light that passes through it.
112. name several uses of the ability of white light to break down into the colors of the spectrum.
113. describe the visible spectrum.
114. explain how lenses and mirrors are used in cameras, eyeglasses, contact lenses, microscopes, and telescopes.

FORCES AND MOVING BODIES

115. define velocity (speed).
116. define acceleration.
117. list units used in measuring time.
118. define force, give examples of force, and calculate force.
119. define friction and give examples of its advantages and disadvantages.
120. define inertia.
121. define momentum.
122. describe what is meant by the law of action and reaction.
123. explain how forces work to make possible air and space flight.
124. define gravity and discuss its relationship to mass and weight.

WORK AND MACHINES, POWER

125. answer questions about simple machines given diagrams and pertinent data.
126. define work and do simple problems involving work.
127. measure power--i.e. horsepower, mechanical and electrical efficiency.
128. name the major simple machines and give a common example for each.
129. demonstrate how all machines are derived from simple machines.

NUCLEAR ENERGY

130. define radioactivity.
131. name several important radioactive elements.
132. define what is meant by "half-life" of a radioactive substance.
133. describe and distinguish between nuclear fission and fusion.
134. describe what is meant by a chain reaction.
135. describe the basic structure and function of nuclear power reactors.
136. list several uses, advantages and disadvantages of nuclear energy.

MOORESTOWN HIGH SCHOOL

SCIENCE COURSE DESCRIPTIONS

MOORESTOWN HIGH SCHOOL SCIENCE DEPARTMENT

DESCRIPTIONS OF ALL HIGH SCHOOL SCIENCE

COURSES

*Fundamentals of Earth and Space Science (S) - 200
(6 credits - 3 double periods per week)

This is an introductory course intended to provide each student with a basic understanding of the planet Earth, and its relationship to the rest of the known universe. The course focuses upon four major topics:

1. General Astronomy
2. The Earth as a Planet
3. The History of Life Forms
4. Man and His Environment

Although the program does not require difficult or extensive reading, it does emphasize the development of a systematic approach to making observations, drawing charts and maps, organizing information, and identifying important concepts and ideas. Hands-on activities are an important aspect of the classroom instruction. The formulation of good study habits and self-discipline is stressed. The course is particularly suited for the students who have difficulty in reading technical material.

*Introduction to Astronomy and Geoscience (I) 201
(6 credits - 3 double periods per week)

This course is designed to lead the student to better understand and appreciate the infinitely complex yet orderly natural system of which the Earth is a part. The methods and tools of the astronomer and geologist are introduced so the student is able to work with them in developing his/her own understanding. The topics covered include: stellar evolution, basic mechanics of planetary motion, solar and lunar phenomena, earth materials, evolution, and oceanography. Ten weeks are devoted to Astronomy, 20 weeks to Geology, and 10 weeks to Paleontology and Oceanography. The student is expected to keep a complete notebook in addition to completing assigned homework and laboratory work. Because this is an introductory course, students are also introduced to study skills and attitudes necessary for success in future science courses. Laboratory techniques including exactness and precision are stressed so that the student will appreciate the

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rate of one credit per thirty hours after completion and a successful evaluation. Prerequisite: Basic course to which the topic is related.

*Environmental Science (S) 204
(3 credits - 3 double periods per week - one semester)

This is a general introductory course in applied science intended for students of various interests and academic abilities. This course will provide students with a basic understanding of the living and non-living factors that influence their environment. The human environment will be studied in both its unspoiled and spoiled condition.

Depending upon the interests and academic abilities of the students, they will study a wide variety of topics, such as: ecology; extinction; populations; energy, agriculture; air, water and noise pollution; conservation; pest control; solid waste and recycling, and environmental law. The course will involve an equal emphasis on laboratory activities and lecture/discussion. Various indoor and outdoor hands-on activities will be used. The students will measure various air and water pollutants, perform soil analyses, perform material recycling activities, estimate plant and animal populations and a wide variety of other activities. When available, quest speakers presenting various occupations that directly affect the human environment will be incorporated into the course.

With the approval of the instructor, each student will investigate a particular area of interest to them that relates to environmental science, and complete an in-depth course project. This course is not to be taken in lieu of biology, chemistry, or physics by a student who will attend college. It can, however, be used as laboratory science course for college admission. Prerequisite: Successful completion of one science course.

*Human Biology (S) 213
(3 credits - 3 double periods per week - one semester)

This is a general introductory course in human biology intended for students of various interests and academic abilities. The course will provide each student with a basic understanding of: (a) the structure and function of his/her own body, and (b) the various factors that influence his/her quality of life.

The students will study the human body in both the healthy and diseased condition. Health and medical related activities and techniques (i.e., measuring lung capacity and blood pressure, recreating an epidemic, etc.) will be integrated into the course topics. The course will use a balance of lecture/discussion and laboratory/demonstration for instruction. When available, guest speakers involved in health and medical related fields will be incorporated into the course.

The topics to be covered include: (a) the general plan of the human body, (b) causes of human disease, (c) prevention and cure of disease, (d) chemistry of the human body, (e) structure and function of cells, tissues, and organs, (f) an in-depth investigation of the organ systems (i.e., digestive, nervous, skeletal, etc.), and (g) the influence of health and medical practices on athletic performance. With the approval of the instructor, all students will be expected to complete a course project related to a specific area of interest that involves human biology. This course is not recommended to be taken in lieu of biology, chemistry, or physics by a student who will attend college. It can, however, be used as a laboratory science course for college admission. Prerequisite: Successful completion of a previous science course.

are stressed in the course. Topics will vary from year to year depending on the nature of the class. Examples of previous units covered include: Climatology, Meteorology, Consumer Chemistry, Metallurgy, Physical Oceanography, and Universal Physics. This course is not to be taken in leiu of the traditional chemistry and physics courses by a student who will major in science in college. Prerequisite: One science course.

*Organic Chemistry (I) 241
(3 credits - 6 periods per week - one semester)

Organic Chemistry is an introductory course in the chemistry of carbon compounds. Emphasis is placed on the fundamental structure, properties, and inter-relationships of the basic organic chemical groups. In the laboratory, basic organic reactions will be studied, organic compounds will be synthesized, and practical uses of basic organic chemicals will be investigated. Some units of study are: Hydrocarbons, alcohols, esters, aldehydes and ketones, and organic acids. The course meets two triple periods per week. Prerequisite: Successful completion of Chemistry or Chem Study.

*Advanced Placement Chemistry (A) 242
(3 credits - 3 double periods per week - one semester)

Advanced Placement Chemistry deals with the same basic chemical considerations as a first year course in chemistry, but the topics are studied in greater depth, much like they would be studied in a freshman college chemistry course. The student should expect to spend an amount of time outside of class on assigned work (problem sets, lab reports), which is at least equal to that formally scheduled for class and laboratory. Often a student must continue with a lab procedure beyond the normally scheduled dismissal time. This course is designed to be taken only after the successful completion of a year of chemistry. The advanced work in chemistry should not displace any other part of the student's science or mathematics curriculum. Prerequisites: Algebra II and Chemistry.

*Advanced Placement Biology (A) 243
(6 credits - 3 double periods per week)

Advanced Placement Biology follows the curriculum outline set up by the Advanced Placement Program of the College Board. The course is the equivalent of a college course in biology and uses a college level textbook as well as Scientific American reprints as required reading. The tests in the course include lab practicals as well as unit tests in which a strong emphasis is placed on essays. Because of the nature and scope of the curriculum, the pace is fast and the student is expected to spend time outside of class in preparation of lab reports, journal reviews and a term paper as well as required reading and studying for tests. This course is designed to make students competitive on the AP exam and on the Biology Achievement Tests and should be taken only after the successful completion of a year of biology and chemistry.

Independent Science Study Program (S)** 250

ISSP provides for additional, in-depth study of topics beyond the scope of the basic courses and is not to be taken in place of these existing courses. The student (Junior or Senior only) will pursue a study under the supervision of a science teacher. The study will originate with the student and teacher, and must be approved in advance by submitting an application to the science department supervisor. The factors that will influence and limit the scope and nature of the study will be time, space, materials, and equipment. Credit will be given at the

Life Studies (S) 212
(5 credits - 5 single periods per week)

This is a general course in the study of living things and their environment. Topics included in this course are cells, reproduction, heredity, ecology and the study of plants and animals. It involves laboratory experiences and work in small groups. Students will become familiar with laboratory equipment and discover some of the fundamental concepts of biology for themselves. A major objective of Life Studies is to foster in students an appreciation of the beauty and diversity of the living things on earth. The course is particularly suited for the students who have difficulty in reading technical material.

*Chemistry (Traditional) (S) 220
(6 credits - 3 double periods per week)

Chemistry is a first-year course in basic inorganic chemistry which enables the student to verify and reinforce the concepts presented by the teacher and the text in the traditional manner. The course emphasizes student understanding of fundamental atomic structure of matter and its relationship to the chemical and physical properties of matter. These relationships are discussed in terms of the energy and forces involved in the formation of more complex substances. Topics include atomic and molecular structure, behavior of solids, liquids and gases, properties of solutions, chemical kinetics, chemical equilibrium, acid-base theory, Redox, electrochemistry, and stoichiometry. Prerequisites: Introduction to Algebra II or Algebra II completed or taken concurrently, and successful completion of one other science course.

*Chem Study Chemistry (I) 221
(6 credits - 3 double periods per week)

This course includes the same topics as the traditional chemistry course. However, the topics are presented in the discovery, or investigative manner which requires a student to have a higher level of cognitive development. To be successful, a student must have the ability to use deductive reasoning and be able to analyze data in order to reach his/her own conclusions of the scientific concept. The concept is introduced through experimentation by the more independent-minded student and then discussed in class. The student should expect to spend an amount of time outside of class on assigned work (problem sets, lab reports), which is at least equal to that formally schedules for class and laboratory. Prerequisites: Introduction to Algebra II or Algebra II completed or taken concurrently, and successful completion of one other science course.

*Physics (I) 230
(6 credits - 3 double periods per week)

Physics is a study of matter and energy. Emphasis is placed on learning fundamental concepts through the experimental approach. some traditional methods are retained in the presentation of topics as well as some modern approaches such as PSSC (Physical Science Study Committee) methods. Topics include mechanics, structure of matter, wave motion, heat, sound, light, and electricity. Prerequisite: Math Analysis should be completed or taken concurrently and successful completion of two years of science.

*Physical Science (S) 231
(6 credits - 3 double periods per week)

Discovery through experimentation and scientific theory are used in equal proportions to study basic concepts of general physical properties. Their practical applications as applied to the Universe, the Earth, and everyday living

role of the scientist in an increasingly complex and demanding society. Because of the challenging nature of this course, upperclass students who have not taken part in it may wish to elect it.

*Astronomy (S) 202
(3 credits - 3 double periods per week - one semester)

The course will address a wide variety of ancient and modern topics. While most of the work will be descriptive, it is assumed that a moderate treatment of mathematical concepts will be necessary. Students will engage in observation with telescopes and other optical equipment. Both the day and night sky will be studied, and a number of evening meetings will be required. A term project, chosen by the participant, will be a course requisite, Prerequisite: Introduction to Astronomy and Geoscience or Fundamentals of Earth and Science Space. This course is not recommended to be taken in lieu of Chemistry and/or Physics by a student who will attend college. It can, however, be used as a laboratory science course for college admission.

*Biology (Traditional) (S) 210
(6 credits - 3 double periods per week)

Traditional Biology is a laboratory course which enables the student the opportunity to verify the concepts presented by the text and discussed in the classroom in the traditional manner. The student will study and examine a variety of problems shared by all living things, which range from molecular and cellular organization to features of metabolism, responsiveness, reproduction, evolution and ecology. In the lab, the student will use materials and equipment of the biologists in his/her attempt to learn more about life. Introduction to Astronomy/Geoscience is not a prerequisite, but it may be helpful in introducing students to science concepts, the science process, and basic laboratory techniques. Students planning on taking this course in ninth grade should have acquired an above average mastery of basic scientific concepts, scientific processes and laboratory skills in his/her middle school science program.

*Biological Sciences Curriculum Study (BSCS) (Blue) (S) 211
(6 credits - 3 double periods per week)

This course includes the same basic topics as the traditional biology course. However, the BSCS approach to Biology emphasizes discovery and investigation rather than verification (traditional approach) of biological concepts. For this reason, the laboratory work is integrated with the text material. BSCS Biology is an introductory course designed to give the student an opportunity to understand both the nature of biological science and its processes, and the knowledge resulting from scientific research. Emphasis is also placed on how we know what we know, in an attempt to achieve a significant understanding of the interaction of the facts and ideas in science. Emphasis is placed on the student's ability to perceive and critically analyze various types of problem situations in an attempt to allow growth in thinking skills. topics include photosynthesis, respiration, protein syntheses, chromosome theory of heredity, digestion, excretion, animal behavior, population studies, the structure of societies and communities, etc. Students who elect to take this course in ninth grade should have demonstrated in his/her middle school science classes an above average understanding of the basic concepts of science. The student should have also demonstrated an above average understanding of the processes of science, and have mastery of basic laboratory skills.

*Environmental Geology (S) 203
(3 credits - 3 double periods
per week - one semester)

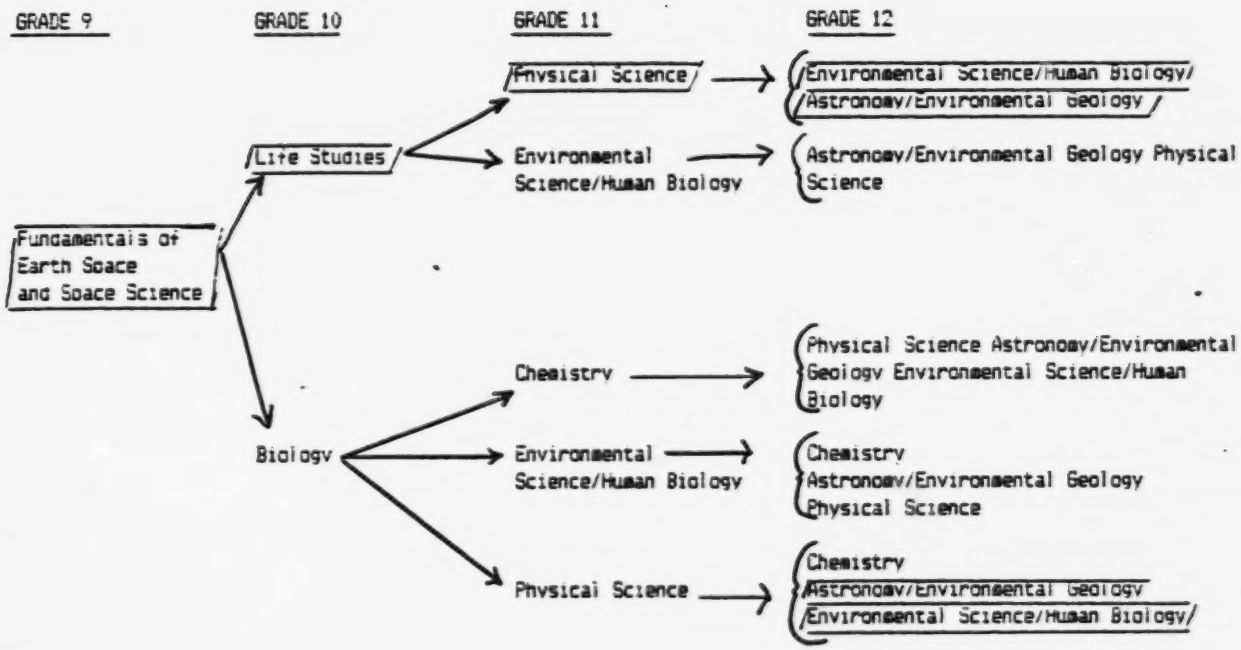
Environmental Geology is applied geology and as such focuses on the entire spectrum of possible interactions between people and the physical environment. The course will address itself to the philosophy and fundamental principles important in the study of environmental geology. It will concern itself with such geologic hazards as flooding, landslides, earthquake activity, volcanic activity and coastal processes. Finally, it will examine the complicated interactions between people and the environment, including water use, waste disposal, and the geological aspects of environmental health.

An independent study project will be required for successful completion of this course. Field trips will be an integral part of this program and as such, the field work will be accomplished on weekends. Prerequisite: Introduction to astronomy and Geoscience or Fundamentals of Earth and Space Science. This course is not recommended to be taken in lieu of Chemistry and/or Physics by a student who will attend college. It can, however, be used as a laboratory science course for college admission.

FLOW CHARTS FOR STUDENT SELECTION

OF

SCIENCE COURSES IN GRADES NINE THROUGH TWELVE



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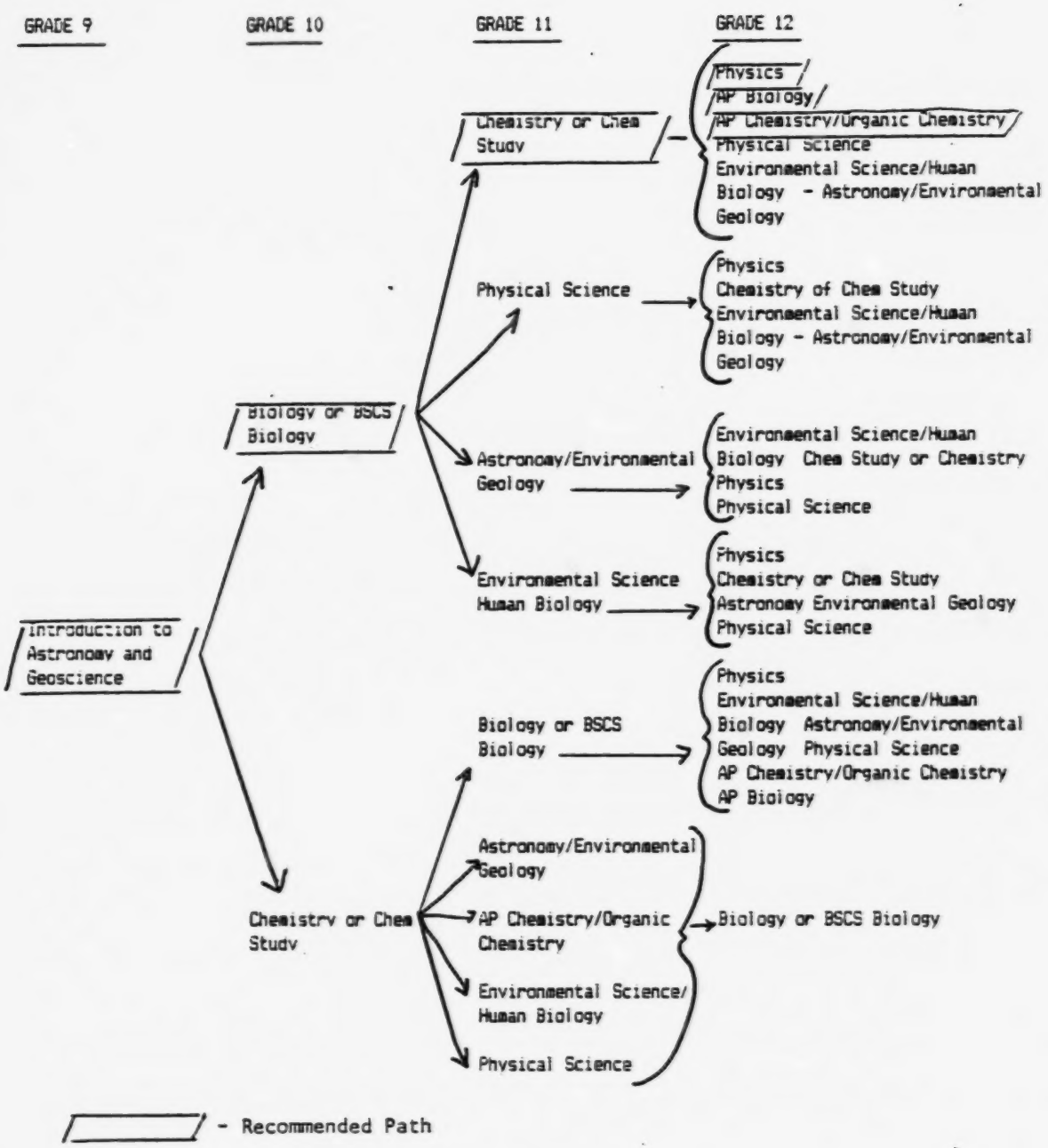
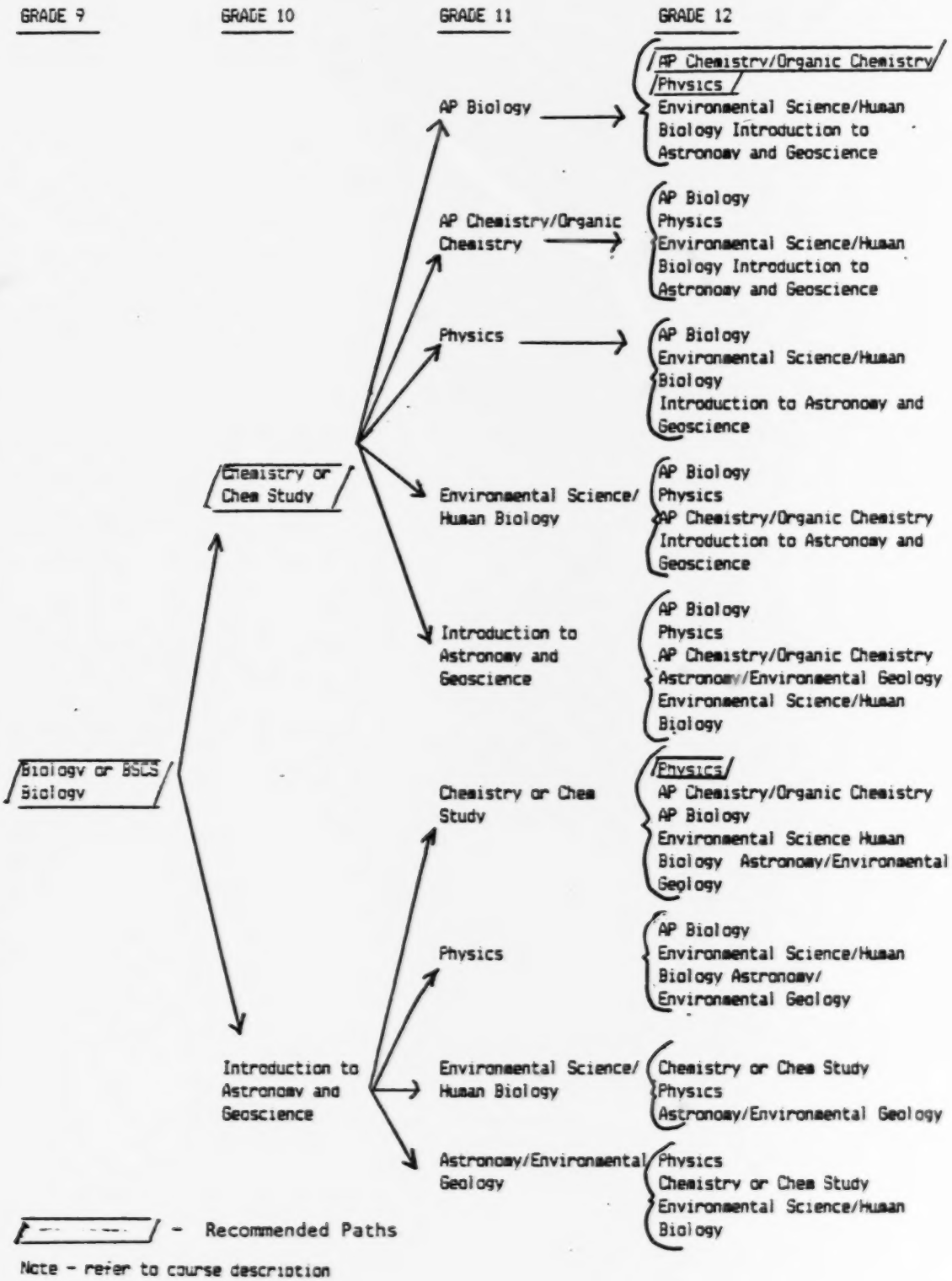

GRADE 9
GRADE 10
GRADE 11
GRADE 12
Introduction to Astronomy and Geoscience
Biology or BSCS Biology
Chemistry or Chem Study
Physics
AP Biology
AP Chemistry/Organic Chemistry
Physical Science
Environmental Science/Human Biology - Astronomy/Environmental Geology
Physical Science
Physics
Chemistry of Chem Study
Environmental Science/Human Biology - Astronomy/Environmental Geology
Astronomy/Environmental Geology
Environmental Science/Human Biology Chem Study or Chemistry
Physics
Physical Science
Environmental Science Human Biology
Physics
Chemistry or Chem Study
Astronomy Environmental Geology
Physical Science
Biology or BSCS Biology
Physics
Environmental Science/Human Biology Astronomy/Environmental Geology Physical Science
AP Chemistry/Organic Chemistry
AP Biology
Chemistry or Chem Study
Astronomy/Environmental Geology
AP Chemistry/Organic Chemistry
Environmental Science/ Human Biology
Physical Science
Biology or BSCS Biology
- Recommended Path


GRADE 9
GRADE 10
GRADE 11
GRADE 12
Biology or BSCS Biology
Chemistry or Chem Study
Introduction to Astronomy and Geoscience
AP Biology
AP Chemistry/Organic Chemistry
Physics
Environmental Science/Human Biology
Introduction to Astronomy and Geoscience
AP Chemistry/Organic Chemistry
AP Biology
Physics
Environmental Science/Human Biology
Introduction to Astronomy and Geoscience
Physics
AP Biology
Environmental Science/Human Biology
Introduction to Astronomy and Geoscience
Environmental Science/ Human Biology
AP Biology
Physics
AP Chemistry/Organic Chemistry
Introduction to Astronomy and Geoscience
Introduction to Astronomy and Geoscience
AP Biology
Physics
AP Chemistry/Organic Chemistry
Astronomy/Environmental Geology
Environmental Science/Human Biology
Chemistry or Chem Study
Physics
AP Chemistry/Organic Chemistry
AP Biology
Environmental Science Human Biology Astronomy/Environmental Geology
Physics
AP Biology
Environmental Science/Human Biology Astronomy/ Environmental Geology
Environmental Science/ Human Biology
Chemistry or Chem Study
Physics
Astronomy/Environmental Geology
Astronomy/Environmental Geology
Physics
Chemistry or Chem Study
Environmental Science/Human Biology
- Recommended Paths
Note - refer to course description

SCIENCE SUBJECT PROFICIENCIES

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: FUNDAMENTALS OF EARTH AND SPACE SCIENCE

CREDITS: 6
DATE: 6/83

In order to receive credit for the above subject, the student must demonstrate mastery of 60% of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

1. combine concepts, principles and generalizations through the use of effective study skills in:
   a. reading and comprehension.
   b. note taking.
   c. organization.
   d. completion of assignments.
   e. disciplined work habits.
2. use required laboratory equipment and supplies in a safe manner.
3. employ skills of mathematics in solving problems.
4. perform correct measurements using the metric system and metric measuring devices.
5. use models, maps, charts, and graphs to make interpretions of the physical world.
6. define science.
7. describe how science concerns itself with the following processes: observation, inference, prediction, and problem-solving.
8. distinguish between quantitative and qualitative observations.
9. state and describe the steps needed to solve a problem and/or conduct a scientific experiment.
10. define the terms geology, astronomy and oceanography.
11. state and explain the basic relationships that exist between the sun and its member bodies in the solar system.
12. trace and generalize the basic evolution of the stars and the universe.
13. identify the structure and composition of the earth, the conditions under which various materials were formed, and the forces which modify and change the earth, including plate tectonics, earthquakes, and volcanic activity.
14. recognize the similarities and differences between rocks and minerals.
15. identify the structure and composition of the earth.
16. identify and relate the importance of water on our planet.
17. identify relationships between the various factors that create weather conditions.
18. relate the origin, evolution and sequence of development of life forms on the earth.
19. describe various methods of preventing and controlling pollution.
20. discuss the limits of the planet's energy sources, including fossil fuel, nuclear fuel, and solar energy.
21. explain how oceanography concerns itself with the salinity of the oceans, marine biology, marine topography, and motions of tides, waves, currents, and formation of shorelines.

22. discuss the impact of the improper use of land, water, and air on the earth.
23. complete a field study project based on long term observations of a local stream.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure

NC - No Credit
P - Pass
F - Fail
WF - Withdrew Failing
WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: INTRODUCTION TO ASTRONOMY AND GEOSCIENCE CREDITS: 6
DATE: 6/83

In order to receive credit for the above subject, the student must demonstrate a mastery level of 60% for each of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

1. combine concepts, principles and generalizations through the use of effective study skills in:
   a. reading and comprehension.
   b. note taking.
   c. organization.
   d. completion of assignments.
   e. disciplined work habits.
2. use required laboratory equipment and supplies in a safe manner.
3. design and write laboratory reports which include the formulation of hypotheses.
4. employ skills of mathematics in solving problems.
5. perform correct measurements using the metric system and metric measuring devices.
6. use models, maps, charts, and graphs to make interpretions of the physical world.
7. define science.
8. describe how science concerns itself with the following processes: observation, inference, prediction, and problem-solving.
9. distinguish between quantitative and qualitative observations.
10. state and describe the steps needed to solve a problem and/or conduct a scientific experiment.
11. define the terms geology, astronomy and geoscience.
12. discuss and identify the relative positions of the major astronomical bodies in the universe.
13. describe the nature of forces which exist between astronomical bodies.
14. identify the structure and composition of the earth, the conditions under which various materials were formed, and the forces which modify and change the earth, including plate tectonics, earthquakes, and volcanic activity.
15. identify the origin and nature of earth materials such as rocks and minerals.
16. explain what is meant by the "sea-air-land interface".
17. identify relationships between the various factors that create weather conditions.
18. relate the origin, evolution and sequence of development of life forms on the earth.
19. describe various methods of preventing and controlling pollution.
20. discuss the limits of the planet's energy sources, including fossil fuel, nuclear fuel, and solar energy.
21. explain the importance of water on the planet, including fresh and oceanic sources.

22. explain how oceanography concerns itself with the salinity of the oceans, marine biology, marine topography, and motions of tides, waves, currents, and formation of shorelines.
23. discuss the impact of the improper use of land, water, and air on the earth.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure
NC - No Credit
P - Pass
F - Fail
WF - Withdrew Failing
WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: HUMAN BIOLOGY

CREDITS: 3
DATE: 7/83

In order to receive credit for the above subject, the student must demonstrate mastery of 60% of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

THE GENERAL PLAN OF THE HUMAN BODY (Chapter 1):

1-1. list and define the major fields of study that involve the study of human biology.
1-2. diagram a typical animal cell, label the major organelles, and state a function for each.
1-3. briefly define the major human body systems by listing the structures involved, and the functions that each perform.
1-4. identify the major planes of orientation and the major cavities of the human body.
1-5. match the major organs of the human body with its appropriate body cavity.

CELLS, TISSUES AND TUMORS (Chapter 2):

2-1. describe the processes of diffusion, osmosis, filtration, and active transport.
2-2. outline the stages of cell division.
2-3. define the term tissue.
2-4. if given diagrams or descriptions, differentiate between the major kinds of animal tissue.
2-4. explain how the different tissues combine to form organs.
2-5. explain what a tumor is and distinguish between the different types.
2-6. accurately measure the size of a microscopic organism and/or cell in microns and/or micrometers.
2-7. using a microscope, identify the tissue type on a slide.

MEMBRANES (Chapter 3):

3-1. define the term membrane.
3-2. describe the major categories of membranes and list a function for each.
3-3. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

CHEMISTRY, MATTER AND LIFE (Chapter 4):

4-1. list the basic chemical constituents of the human body in decreasing order by their relative mass, and discuss their importance.

4-2. accurately determine the pH of a solution.

BODY FLUIDS (Chapter 5):

5-1. describe the relationship between body fluids and homeostasis.
5-2. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

BODY TEMPERATURE AND ITS REGULATION (Chapter 6):

6-1. explain how heat is produced, lost and regulated by the body.
6-2. list and describe the various conditions that relate to abnormal body temperature.

DISEASE AND DISEASE PRODUCING ORGANISMS (Chapter 7):

7-1. define the term disease.
7-2. list and explain the major direct causes of human disease.
7-3. list and explain the major predisposing causes of human disease.
7-4. name and explain the most important ways that diseases are spread.
7-5. describe the major characteristics of organisms associated with human diseases.
7-6. correctly prepare and inoculate a petri dish containing culture media with microorganisms.
7-7. determine the effect of antibiotics, antiseptics and other environmental conditions on microbial growth.
7-8. using microbiological investigative techniques, determine the individual responsible for starting a simulated epidemic.

THE SKIN IN HEALTH AND DISEASE (Chapter 8):

8-1. list the major structures of the skin.
8-2. discuss the function of each major structure of the skin.
8-3. describe how the skin is involved in the regulation of body temperature.
8-4. explain the role of the skin in sensing changes in the external environment.
8-5. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

BONES AND JOINTS (Chapter 9):

9-1. list the major functions of the skeletal system.
9-2. identify the major bones of the human body from a diagram and/or a model of a skeleton.
9-3. distinguish between cartilage, bone, ligaments, and tendons.
9-4. identify the major types of skeletal joints and give an example of each type.
9-5. name and describe several major disorders or diseases,

including the cause, symptoms, treatment, prevention and cure if known.

THE MUSCULAR SYSTEM (Chapter 10):

10-1. list the major functions of the muscular system.
10-2. identify the major muscles of the human body.
10-3. describe th structure of a typical skeletal muscle.
10-4. list the 4 types of muscle movement and give an example of each.
10-5. explain the function of antagonistic muscle groups.
10-6. distinguish between the structure, function, and location of the 3 major muscle tissue types.
10-7. measure the effect of exercise and practice on muscle strength and flexibility.
10-8. measure the flexibility and strength of a person using an available kit.
10-9. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

THE NERVOUS SYSTEM (Chapters 11 and 12):

11-1. trace the path of a nerve impulse through a nerve cell naming the cellular structures involved.
11-2. name and describe the major divisions of the nervous system.
11-3. describe the structure and function of the spinal cord.
11-4. identify the major parts of the brain and discuss the function of each.
11-5. explain what is meant by a reflex arc, and give several examples.
11-6. name and describe several major disorders or diseases, of the central nervous system, , including the cause, symptoms, treatment, prevention and cure if known.
12-1. name the major human sense organs.
12-2. list the major functions of each sense organ.
12-3. trace the path of sound waves through the ear to the brain.
12-4. trace the path of light waves through the eye to the brain.
12-5. perform an eye test on a person.
12-6. accurately test a person's hearing.
12-7. determine the location of taste receptors on the tongue.
12-8. determine the effect of lenses on vision.
12-9. name and describe several major disorders or diseases, of the sense organs, including the cause, symptoms, treatment, prevention and cure if known.

CIRCULATORY SYSTEM (Chapters 13,14 & 15):

13-1. list the major functions of the human circulatory system.
13-2. name the parts of the blood and state the functions of each.
13-3. distinguish between the different human blood types including both the ABO and Rh systems.

13-4. describe the different tests that are done in a complete

blood study.

13-5. correctly determine the blood type (ABO and Rh) of a given blood sample.

13-6. determine blood clotting time and bleeding time of an individual.

13-7. correctly prepare and stain a blood smear slide.

13-8. determine a person's blood type using a saliva blood typing kit.

13-9. name and describe several major disorders or diseases, of the blood, including the cause, symptoms, treatment, prevention and cure if known.

14-1. describe the influence of chemical and physical factors on the heartbeat rate.

14-2. given a preserved heart or a heart model, identify the major structures and explain a function of each.

14-3. name and describe several major disorders or diseases, of the heart, including the cause, symptoms, treatment, prevention and cure if known.

15-1. distinguish between veins, arteries, and capillaries.

15-2. trace the path of a blood cell, naming the structures the blood cell would come in contact with and discussing the changes that would occur, from its initial entry into the heart and its eventual return to the same place.

15-3. describe the causes of blood pressure and the ways the body maintains normal blood pressure.

15-4. using a student blood pressure set, correctly measure the blood pressure of a person.

15-5. determine the pulse rate of a person under various environmental conditions.

15-6. name and describe several major disorders or diseases, of the blood vessels, including the cause, symptoms, treatment, prevention and cure if known.

THE LYMPHATIC SYSTEM AND LYMPHOID TISSUE (Chapter 16):

16-1. describe the principal functions of the lymphatic system.

16-2. distinguish between lymph and plasma fluid.

16-3. name the principal lymphatic organs and explain their function.

16-4. discuss the relationship between the lymphatic system and immunity.

16-5. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

RESPIRATION (Chapter 17):

17-1. define and describe the process of breathing.

17-2. distinguish between breathing and respiration.

17-3. list the major functions of the respiratory system.

17-4. trace the path of a molecule of oxygen through the human respiratory system until it eventually enters cells and the path of carbon dioxide leaving the body from the the cells.

17-5. describe how sound production occurs in the human body (larynx).

17-6. measure the vital lung capacity and tidal lung volume of an individual.

17-7. correctly demonstrate the Heimlich maneuver - a simple procedure for dislodging food from the trachea.

17-8. measure the carbon dioxide level of exhaled air under various levels of physical activity.
17-9. determine the basal metabolic rate of a person.
17-10. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

DIGESTION AND INDIGESTION (Chapter 18):

18-1. list the five major classes of nutrients and explain their purpose.
18-2. describe the importance of enzymes to digestion.
18-3. explain what is meant by a deficiency disease and give several examples.
18-4. describe the structure, function and development of teeth.
18-5. explain the major purposes of digestion.
18-6. trace the path of a food particle through the human digestion system naming the structures involved and the changes that occur to the food particle until it is passed out as waste.
18-7. determine the effect of enzymes on food digestion.
18-8. analyze a person's diet for a 24-hour period to determine the nutritional value.
18-9. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

THE URINARY SYSTEM AND ITS DISORDERS (Chapter 19):

19-1. list and describe the major organs of excretion.
19-2. name the major parts of the urinary system.
19-3. state the functions of the urinary system.
19-4. describe the anatomy and physiology of the kidney.
19-5. perform the tests routinely used in urinalysis.
19-6. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

GLANDS AND HORMONES (Chapter 20):

20-1. distinguish between a duct gland and a ductless gland.
20-2. name the major ductless glands and discuss their primary function.
20-3. name and discuss the function of the major hormones.
20-4. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

REPRODUCTION (Chapter 21):

21-1. identify the structure of both the male and female reproductive organs.
21-2. explain the function of the reproductive organs for both sexes.
21-3. list the changes that occur during the ovarian and

menstrual cycles.

21-4. describe the process involved in the development of the fertilized egg to the birth of the new individual.

21-5. graph the changes that occur in the concentrations of female reproductive hormones during the menstrual cycle.

21-6. name and describe several major disorders or diseases, including the cause, symptoms, treatment, prevention and cure if known.

GENERAL LABORATORY RELATED PROFICIENCIES:

G-1. dissect an adult white rat and identify the major anatomical structures. (required for all students). (Chapters 1, 3, 8-21)

G-2. complete a major course project involving some aspect of human biology (required for all students).

G-3. interpret data, charts and graphs.

G-4. carry out laboratory activities and be able to explain the procedures, observations, results, and conclusions orally or in writing.

G-5. perform correct measurements using metric instruments.

G-6. correctly maintain and care for a microscope.

G-7. correctly prepare a wet mount slide.

G-8. accurately focus a compound microscope, given a prepared slide.

OPTIONAL COURSE PROFICIENCIES

HEREDITY AND HEREDITARY DISEASES (Chapter 22):

22-1. explain the basis of sex determination and sex-linked traits in humans.

22-2. explain the principles of inheritance in humans.

22-3. identify some human characteristics that are inherited and determine whether they are dominant or recessive traits.

IMMUNITY, VACCINES AND SERUMS (Chapter 23):

23-1. describe the major methods used in disease prevention.

23-2. describe the major methods used to cure disease.

23-3. explain how the human body defends itself against disease.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement	NC - No Credit
B - Above Average	P - Pass
C - Average	F - Fail
D - Below Average	WF - Withdrew Failing
E - Failure	WP - Withdrew Passing

SCIENCE DEPARTMENT

Moorestown High School

Subject Proficiency Requirements

SUBJECT: Environmental Science

CREDITS: 3
DATE: 7/83

Every student must complete the following proficiency to receive credit for this course:

M- The student must complete a major course project involving some aspect of environmental science.

In addition to the above proficiency, the student must demonstrate mastery of 60% of the following proficiencies to receive credit for the course. Each proficiency should be read as "The student should be able to . . . "

I. Introduction to Ecological Principles and Ecosystems

1-1 distinguish between niche, ecosystem and biome.
1-2 list and describe major biomes
1-3 construct a food web, food chain and food pyrimid
1-4 explain major nutrient cycles
1-5 describe the natural succession in a deciduous forest.
1-6 give examples of the economic, social and legal impact of pollution.
1-7 list and describe major ecosystems
1-8 describe the relationship of global ecosystems to the environmental balance of the environment.
1-9 explain the concept of carrying capacity.
1-10analyse data on representative natural populations
1-11 relate roles and niches of organisms in natural and laboratory ecosystems
1-12 measure various abiotic factors in the environment
1-13 identify representative organisms in given ecosystems

II. Extinction of Species

2-1 Explain the definition of species and its limitations
2-2 list the major causes of extinction
2-3 explain, by using specific examples, how a species becomes extinct
2-4 discuss the ecological, social, economic and asthetic impact of extinction
2-5 list major extinct species
2-6 list major endangered species and why they are endangered
2-7 write or present a report on an assigned endangered or extinct species
2-8 summarize the research procedure followed in the Case of the Bighorn Sheep.

III. Human Population Dynamics

3-1 find density of an area given necessary data
3-2 describe factors which change populations in an area
3-3 recognize representative population pyrimids
3-4 relate population growth to land use problems
3-5 list major social attitudes concerning population control
3-6 list major legal precedents effecting population control in the United States and other countries
3-7 compare the population of progressive and third world countries
3-8 project the human conditions in countries or areas given the average population growth rate and the per capita income
3-9 analyze data for natural populations and project future of population
3-10 estimate the size of populations in artificial and/or natural areas
3-11 differentiate between open and closed populations
3-12 read and interpret population data on graphs and tables

IV. Agricultural Systems & Pest Control

4-1 analyze soil samples for abiotic factors
4-2 analyze soil samples for biotic factors
4-3 list common agricultural practices and discuss their environmental impact
4-4 use millipore filter apparatus in soil analysis
4-5 use a Berlese apparatus
4-6 list major food additives and their effects on human health
4-7 discuss the world-wide food production problems
4-8 identify major soil organisms
4-9 list major pesticides and discuss their positive and negative aspects, focusing on DDT
4-10 describe alternative methods of pest control
4-11 discuss the composition of soil
4-12 discuss pollitical and economic impact of pesticides

V. Air Quality

5-1 collect and measure various major air pollutants
5-2 describe the nature of the atmosphere
5-3 list the major sources of air pollution
5-4 list and describe major air pollutants
5-5 describe those events that lead to a temperature inversion
5-6 simulate a temperature inversion in the lab
5-7 describe air pollution control devices commonly in use
5-8 describe the effects of air pollution on certain organisms including humans
5-9 demonstrate a knowledge of air pollution control laws
5-10 describe & simulate the effects of acid rain on organisms
5-11 use lab procedures & techniques to test for effects of air pollution
5-12 predict effects of air pollution on representative organisms and varify in the laboratory
5-13 list and discuss the global effects of air pollution

VI. Water Quality

6-1 draw a diagram of the natural water cycle
6-2 list sources of water pollution
6-3 describe abiotic and biotic factors in freshwater systems
6-4 define eutrophication
6-5 discuss natural and artificial causes of eutrophication
6-6 discuss controls of eutrophication
6-7 list fresh water pollutants
6-8 list salt water pollutants
6-9 list indicator organisms for fresh and salt water systems and describe the habitat in which they are found
6-10 sample, measure and analyse water for its physical & chemical factors
6-11 describe primary, secondary and tertiary treatment in a sewage disposal plant
6-12 discuss the treatment of drinking water
6-13 list and discuss the effects of water pollution on economics and human health
6-14 demonstrate an awareness of the legal, economic, social and pollitical implications of water pollution
6-15 analyse data of case studies involving water pollution

VII. Solid Waste

7-1 list and describe the composition of solid waste
7-2 list and discuss common disposal methods
7-3 describe a recycling plant
7-4 describe local recycling efforts
7-5 tell where Moorestown's solid waste is processed.
7-6 simulate various recycling methods in lab experiments
7-7 list activities the individual can do to aid the solid waste problems in Moorestown

VIII. Energy and the Environment

8-1 define energy
8-2 describe major types and forms of energy
8-3 describe the law of conservation of energy
8-4 list major sources of energy
8-5 describe how fossil fuels are acquired and used in energy production
8-6 describe the future of energy sources for the United States and other major countries
8-7 describe the environmental effects of fossil fuels
8-8 describe the production of energy using water and the resulting environmental effects
8-9 describe the basic operations of a nucleur reactor
8-10 discuss the advantages and disadvantages of nucleur power and its potential environmental impact
8-11 list renewable sources of energy and describe their value to the environment and the current energy situation

8-12 discuss the use of thermal power
8-13 discuss how a solar cell operates
8-14 discuss the average energy consumption of U.S. residents, contrasting it with that of other countries
8-15 discuss legal, economic and pollitical implications of energy conservation
8-16 describe methods that can be used by individuals in the country to conserve energy

IX. Noise Pollution(optional)

9-1 describe the characteristics of sound
9-2 describe the measurement of sound
9-3 list major sources of noise pollution and their effects
9-4 describe methods used in controling noise pollution
9-5 discuss legislation and public concern regarding noise pollution
9-6 list what you can do as an individual to control noise pollution

General Laboratory Related Proficiencies

G-1 draw a graph given specific data
G-2 interpret graphs
G-3 organize and present data in the most appropriate form (ie. tables, graphs, diagrams, charts etc.)
G-4 measure and interpret the pH of soil and water samples
G-5 perform correct measurements using metric instruments
G-6 demonstrate the use and care of the compound microscope
G-7 carry out laboratory activities being able to explain procedure, observations, results and conclusions in oral or written form

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: TRADITIONAL BIOLOGY

CREDITS: 6
DATE: 7/83

In order to receive credit for the above subject, the student must demonstrate mastery of 60% of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

BIOLOGY IS THE BRANCH OF SCIENCE WHICH STUDIES LIVING ORGANISMS

1. define the term science.
2. define the term biology
3. describe how science concerns itself with the following processes: observation, inference, prediction, and problem-solving.
4. distinguish between quantitative and qualitative observations.
5. state and describe the steps needed to solve a problem and/or conduct a scientific experiment.
6. list a define the major divisions of biology (i.e.: Zoology, Botany, Cytology, etc.).
7. list and define the major characteristics of life.

THE CELL IS THE BASIC STRUCTURAL AND FUNCTIONAL UNIT OF LIVING THINGS.

8. identify the major organelles of the cell by drawing a diagram of the cell and labeling its parts or by labeling the structures using a diagram prepared by the teacher.
9. state the function of the major cell organelles.
10. using diagrams, determine the similarities and differences between a typical plant and animal cell.
11. distinguish between mitosis and meiosis and explain the major purpose of these processes.
12. explain the relationship between cell organelles, cells, tissues, organs, organ systems, and the organism.
13. explain the principle of homeostasis as it applies to cell function.

ALL LIVING THINGS ARE COMPOSED OF CHEMICAL SUBSTANCES.

14. distinguish between elements, compounds, atoms, molecules and mixtures.
15. state the differences between acids and bases as related to living organisms.
16. distinguish between solids, liquids and gases, and explain how the change of phase of matter is utilized by living organisms in their survival.
17. name several properties of the following inorganic elements and compounds important to life
    a. nitrogen
    b. oxygen
    c. carbon dioxide

d. hydrogen
e. water
f. sulfur
g. trace elements

18. distinguish between inorganic and organic chemicals.
19. discuss the chemical structure, properties, and functions of the following organic chemicals as related to living organisms:
    a. carbohydrates - sugars and starches
    b. lipids - fats, oils and waxes
    c. proteins - amino acids
    d. nucleic acids - DNA and RNA
    e. ATP
    f. vitamins
20. list and discuss the major properties and functions of enzymes and coenzymes.

LIVING THINGS REQUIRE ENERGY AND THERE MUST BE AN INTERCHANGE OF ENERGY IN A BALANCED ENVIRONMENT IF LIVING ORGANISMS ARE TO SURVIVE.

21. describe the process of photosynthesis discussing the organisms and cell structures involved, the major reactants and products, and finally the purpose.
22. describe the process of cell respiration (both aerobic and anaerobic) mentioning the organisms and cell structures involved, the major reactants and products, and finally the purpose.
23. explain the differences between photosynthesis and respiration.
24. explain the interrelationship between photosynthesis and respiration.
25. explain the similarities and differences between fermentation and aerobic respiration.
26. describe the relationship between a food chain and a food web.
27. draw several basic food chains including the basic components (producer, consumer, and decomposer) using actual organisms as examples.
28. explain the relationship between producers, consumers, and decomposers using food chains and food webs.

SCIENTIFIC EVIDENCE INDICATES THAT THE FORMS OF LIFE PRESENTLY ON EARTH HAVE EVOLVED FROM COMMON ANCESTORS AND THAT ALL LIFE FORMS ARE RELATED.

29. briefly discuss the biological history of the earth.
30. discuss the major scientific evidence supporting the Theory of Evolution. (i.e., fossils, embryology, structural similarities, etc.)
31. state the major ideas of Lamarck's Theory of Evolution.
32. define and discuss the following major ideas of Darwin's Theory of Evolution:
    a. overproduction
    b. struggle for existence
    c. variation
    d. survival of the fittest (natural selection)
    e. evolution
    f. adaptation

33. discuss how the factors such as mutation and isolation influence the evolution of species.
34. discuss the characteristics that determine differences and similarities between species.

ALL LIVING ORGANISMS CAN BE CLASSIFIED.

35. list the major principles of classification.
36. classify organisms utilizing the classification system developed by Linneaus.
37. correctly place an organism in the classification hierarchy from bacteria to man.
38. identify at least one plant form and one animal form to its genus and species using a key.
39. identify representative forms of all the major protist, plant, and animal phyla/divisions studied.

THERE IS AN EVER INCREASING ORDER OF COMPLEXITY OF STRUCTURE IN LIVING ORGANISMS.

40. from a list of animals (from amoeba to man) and plants (from algae to flowering plants), explain how these organisms carry on the following life functions (be sure to refer to specific structures found in this organism)
    a. food gathering, eating and/or food production
    b. shape and support
    c. digestion
    d. metabolism
    e. locomotion
    f. absorption
    g. circulation
    h. growth
    i. sensitivity and irritability
    j. excretion
    i. secretion
    k. reproduction

A PATTERN OF INHERITANCE CAN BE OBSERVED OVER A PERIOD OF TIME.

41. explain the differences between sexual and asexual reproduction.
42. state several examples of organisms that reproduce sexually and several examples of those that reproduce asexually.
43. explain the roles of mitosis and of meiosis in inheritance.
44. describe the chemical nature of DNA, genes, and chromosomes, and their role in maintaining genetic continuity.
45. list the Mendelian Laws of Inheritance.
46. solve basic Mendelian Inheritance problems involving crosses with one and two traits.
47. distinguish between the phenotype and genotype of an organism.
48. read and explain a family pedigree chart.
49. name and discuss the several significant human genetic traits, and be able to distinguish between those that are dominant and those that are recessive. (i.e., blood types, Rh factor, sex-linked disorders, sex determination, etc.)

CORRECT INFORMATION ABOUT THE HUMAN BODY WILL AID THE STUDENTS IN HIS/HER DAILY LIFE.

50. explain the structure and function of the human body systems given below:
    a. integumentary
    b. skeletal
    c. muscular
    d. respiratory
    e. digestive
    f. excretory
    g. circulatory
    h. lymphatic
    j. endocrine
    k. nervous
    l. reproductive

KNOWLEDGE OF THE DYNAMICS OF ECOLOGY ARE ESSENTIAL FOR INTELLIGENT ENVIRONMENTAL PLANNING AND DECISION MAKING.

51. using examples, define an ecosystem.
52. describe the general conditions of the ecosystem in which the student lives.
53. list and desribe the major environmental factors that influence the natural history of organisms.
54. using examples, distinguish between living and non-living factors.
55. describe the adaptations that organisms use to insure their survival in their particular environment.
56. explain why organisms living in the same ecosystem have similar adaptations.
57. using examples, identify and describe a predator-prey relationship.
58. predict the influence of a given environmental change on an ecosystem

GENERAL LABORATORY AND CLASSROOM RELATED PROFICIENCIES:

G-1. dissect several representative animals, including both vertebrates and invertebrates, and identify the anatomical structures.
G-2 demonstrate a working knowledge of the proper use of biological tools.
G-3. interpret data, charts and graphs.
G-4. carry out laboratory activities and be able to explain the procedures, observations, results, and conclusions orally or in writing.
G-5. correctly perform measurements using metric instruments.
G-6. correctly maintain and care for a microscope.
G-7. correctly prepare a wet mount slide.
G-8. accurately focus a compound microscope, given a prepared slide.
G-9. demonstrate satisfactory ability in the following study skills:
    a. reading textbooks, reference books and laboratory activities.
    b. notetaking.
    c. timely completion of assignments.

d. keeping an organized notebook.
e. working effectively with others.
f. disciplined work habits.
f. following directions.

6-10. exercise the self discipline which is essential to safety in the laboratory, the development of proper classroom behavior, and the development of good work skills.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
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8. Notebook
9. Projects
10. Final examination (departmental)

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A - High Achievement
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C - Average
D - Below Average
E - Failure
NC - No Credit
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F - Fail
WF - Withdrew Failing
WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: BSCS BIOLOGY

CREDITS: 6
DATE: 7/83

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    c. digestion
    d. metabolism
    e. locomotion
    f. absorption
    g. circulation
    h. growth
    i. sensitivity and irritability
    j. excretion
    i. secretion
    k. reproduction

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56. explain why organisms living in the same ecosystem have similar adaptations.
57. using examples, identify and describe a predator-prey relationship.
58. predict the influence of a given environmental change on an ecosystem

GENERAL LABORATORY AND CLASSROOM RELATED PROFICIENCIES:

G-1. dissect several representative animals, including both vertebrates and invertebrates, and identify the anatomical structures.
G-2 demonstrate a working knowledge of the proper use of biological tools.
G-3. interpret data, charts and graphs.
G-4. carry out laboratory activities and be able to explain the procedures, observations, results, and conclusions orally or in writing.
G-5. correctly perform measurements using metric instruments.
G-6. correctly maintain and care for a microscope.
G-7. correctly prepare a wet mount slide.
G-8. accurately focus a compound microscope, given a prepared slide.
G-9. demonstrate satisfactory ability in the following study skills:
    a. reading textbooks, reference books and laboratory activities.
    b. notetaking.
    c. timely completion of assignments.

d. keeping an organized notebook.
e. working effectively with others.
f. disciplined work habits.
f. following directions.

G-10. exercise the self discipline which is essential to safety in the laboratory, the development of proper classroom behavior, and the development of good work skills.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination (departmental)

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure
NC - No Credit
P - Pass
F - Fail
WF - Withdrew Failing
WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: Advanced Placement Biology

CREDITS: 6
DATE: 2/83

In order to receive credit for the above subject, the student must demonstrate mastery of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

MANDATORY PROFICIENCIES - The student must demonstrate mastery of all of the proficiencies in this section.

1. read, understand, analyze and critique articles from scientific journals.
2. organize, research and write in proper form, a research paper on a biology related topic.
3. gather, analyze and interpret laboratory data.
4. organize and present a laboratory report in a neat and logical format.
5. organize and plan out-of-class time to successfully complete long-term assignments.
6. use the resources of the school, town and/or college libraries.
7. use the compound light microscope effectively.
8. use paper and thin layer chromotographic methods.
9. successfully dissect and study a representative mammal.
10. prepare and execute laboratory directions and procedures carefully and accurately.
11. plan his/her time and approach to essay test questions.

SUBJECT AREA PROFICIENCIES - The student must demonstrate mastery of 60% of the following proficiencies.

1. describe the chemistry of the cell.
2. describe the structure of both eukaryotic and prokaryotic cells.
3. explain the physiology of the cell membrane and cellular pellicles.
4. explain anaerobic respiratory patterns in yeast and muscle tissue.
5. explain aerobic glycolysis.
6. describe aerobic citric acid cycle reactions.
7. explain the role of the cytochrome oxidase electron transport system in cellular respiration.
8. recognize various plant and animal cell and tissue types under the compound microscope.
9. identify the major muscles and bones in man.
10. identify the parts of the digestive system in a representative mammal.
11. identify the parts of the respiratory system in a representative mammal.

12. identify the parts of the male and female urogenital systems in a representative mammal.
13. trace the flow of blood through the adult human.
14. trace the flow of blood through the fetal human.
15. identify anatomical and physiological changes that occur in the fetus at birth.
16. explain autotrophic and heterotrophic nutrition patterns.
17. describe the structure of the leaf and its relation to photosynthesis.
18. explain transpiration and the factors effecting it.
19. describe the structure and role of chlorophyll and the chloroplast in photosynthesis.
20. explain cyclic and non-cyclic light reactions of photosynthesis.
21. describe carbon fixation of 3-C and 4-C compounds in plants and differentiate between them.
22. explain the digestion, distribution and absorption of lipids, carbohydrates and proteins.
23. discuss the role of enzymes in animal digestion.
24. discuss the role of the liver, pancreas, gall bladder in human digestion.
25. discuss the role of hormones in digestion.
26. explain gas exchange patterns in plants.
27. explain gas exchange patterns in non-mammalian animals.
28. describe the role of the lung surfactant and its relation to lung function in man.
29. describe oxygen intake and distribution in man.
30. explain carbon dioxide production, distribution and elimination by the blood buffer system in man.
31. describe reproductive patterns in unicellular organisms.
32. describe reproductive patterns in angiosperms.
33. describe reproductive patterns in non-placental animals.
34. describe reproductive patterns in placental animals, particulary in man.
35. explain cleavage, gastrulation, and germ layer derivatives.
36. describe induction, determination and differentiation.
37. discuss the structure and function of RNA & DNA.
38. apply Mendelian patterns of inheritance to problems.
39. apply Mendelian patterns of inheritance to the solution of genetics problems.
40. apply the principles of incomplete dominance inheritance to the solution of problems.
41. apply sex-linked inheritance patterns to solution of genetics problems.
42. explain sex-limited and sex-influenced inheritance.
43. explain linkage and crossing over.
44. name and explain major chromosomal mutation patterns.
45. explain the inheritance of common genetic diseases such as Tay-Sachs, PKU, Sickle Celled Anemia, Hemophilia, etc.
46. name the major plant hormones and discuss their role in plant metabolism.
47. name the endocrine glands and their secretions and explain their effect in man.
48. explain the evolutionary theories of Lamarck and Darwin.
49. discuss modern concepts of natural selection.
50. discuss evolutionary diversity, adaptive radiation, convergence, extinction.

51. recognize the major taxonomic groups of plants, animals, and protists.
52. discuss the major points of the evolutionary history of man.
53. discuss learned and stereotyped behavior.
54. explain biorhythms.
55. discuss common animal societies other than man's.
56. identify representative types of social behavior.
57. explain energy flow and productivity in ecosystems.
58. describe biochemical cycles.
59. explain population growth and regulation of humans and other species.
60. explain community structure, growth and regulation.
61. identify factors effecting various habitats.
62. identify problems related to the intervention of man in nature.
63. identify problems related to human population growth.
64. discuss the economic aspects of bacteria, fungi and algae.
65. discuss the implications of bio-medical research.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Research paper
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

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C - Average
D - Below Average
E - Failure
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SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: PHYSICAL SCIENCE

CREDITS: 6
DATE: 7/83

In order to receive credit for the above subject, the student must demonstrate mastery of 60% of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

SCIENCE AND TOOLS OF SCIENCE

1. define science.
2. describe how science concerns itself with the following processes: observation, inference, prediction, and problem solving.
3. identify the meaning of the following terms: weight, mass, volume, force.
4. distinguish between quantitative and qualitative observations
5. state and describe the steps needed to solve a problem and/or conduct a scientific experiment.

MEASUREMENT IN SCIENCE

6. use the metric system of units for measuring mass, length, and volume.
7. use the english system of units for measuring mass, length, and volume.
8. convert units from english to metric and metric to english.
9. use scientific notation and significant figures in calculations.

THE COMPOSITION OF MATTER: ELEMENTS, COMPOUNDS, AND MIXTURES

10. describe how molecules are composed of atoms bonded together
11. given a list, distinguish between elements, compounds, and mixtures.
12. identify the symbols of "common" elements.
13. explain the relationship between atomic structure and the properties of the elements.
14. describe practical uses of the major elements, compounds and mixtures.
15. classify elements according to their properties (e.g. metals, nonmetals; solids, liquids, gases)
16. distinguish between chemical bonding in which sharing of electrons takes place and bonding in which transfer of electrons takes place.

THE NATURE AND STRUCTURE OF MATTER

17. define an ion as a charged particle and an atom as a neutral particle.
18. distinguish between atoms and molecules.

19. explain the relationship between atomic structure and the properties of the elements.
20. define what is meant by a gas, liquid, and solid in terms of the proximity and relative motion of their particles and in terms of their size and shape.
21. locate protons, neutrons, and electrons in the present model of the atom and state the charge on each.

22. explain the effect of temperature on the physical state (phase) of a substance.
23. name the major phases of matter and give examples for each.
24. describe several physical properties of a substance
25. define, measure, and/or calculate the following physical constants of substances: density, specific gravity, boiling point, melting point, freezing point.
26. draw a diagram of an atom showing the relationship between the nucleus, shells, electrons, protons, and neutrons.
27. use the periodic table to determine the atomic structure, physical and chemical properties of an element.

GAS LAWS

28. explain the relationship between molecular motion and pressure.
29. predict the effect of a temperature change and pressure change on the volume of a gas.
30. solve simple problems using the gas laws.
31. read a barometer to determine atmospheric pressure.
32. explain the process of diffusion.
33. identify supporting evidence for the kinetic theory of gases.
34. describe what is meant by STP.
35. describe some practical uses of the gas laws (e.g.- pneumatic devices).

COMPOUNDS-INORGANIC AND ORGANIC

36. distinguish between simple organic compounds and inorganic compounds.
37. write and identify the chemical formulas for the major inorganic and organic compounds.
38. determine the formula weight of a compound.
39. determine the percent of composition of elements in a compound.
40. discuss the properties of plastics, rubber, synthetic fibers and natural fibers.

THE REACTIONS OF MATTER

41. substantiate that chemical reactions result in new substances with new properties.
42. compare and contrast a physical and chemical change and explain the differences.
43. explain why and how the total mass of reactants must equal total mass of products in ordinary chemical reactions.
44. substantiate that chemical reactions are accompanied by energy changes.
45. describe the factors that effect a chemical reaction.

46. demonstrate the skill in the writing of chemical symbols, formulas and equations.
47. explain the importance and meaning of the laws of definite proportions and the of conservation of matter and energy.
48. balance simple chemical equations.
49. identify simple chemical reactions as to their type using the following classification: synthesis, decomposition, single replacement, double replacement.

ACIDS, BASES AND SALTS

50. describe general properties of acids, alkalis (bases), and salts and describe neutralization.
51. use chemical indicators and pH to determine whether a substance is acidic, basic, or a salt.
52. name some examples of common substances which are acids, bases, and salts.

MIXTURES OF MATTER: SUSPENSIONS AND EMULSIONS

53. define suspension and name several examples.
54. define emulsion and name examples.

MIXTURES OF MATTER: SOLUTIONS

55. given a solution identify the solute and solvent.
56. define the following terms: solute, solvent, solution, solubility, crystal, electrolyte , and ion.
57. discuss the major properties of water, suggesting reasons for each pzoperty.
58. name and discuss the major factors effecting solutions.
59. distinguish between dilute and concentrated solutions.
60. distinguish between saturated, unsaturated, and supersaturated solutions.
61. describe the effect of additives on the boiling point, vapor pressure, and freezing point of solutions (e.g. batteries, automobile antifreeze, rock salt on ice, etc.)

ENERGY

62. given a series of situations, determine which ones represent kinetic energy and which represent potential energy.
63. substantiate that chemical reactions are accompanied by energy changes.
64. cite evidence that energy can be converted from one form to another, but never lost or gained (in ordinary circumstances).
65. distinguish between potential and kinetic energy.
66. name the major forms of energy (e.g. light, heat, etc.).

STATIC ELECTRICITY

67. describe the nature of static electricity.
68. demonstrate how objects can be charged by contact and induction.

69. relate simple static changes to modern-day electrostatic devices (e.g.: capacitor, xerox machine, electrostatic precipitators, etc.)

ELECTRICAL ENERGY

70. define electricity and explain the differences between static electricity, and AC and DC.
71. distinguish between an electric motor and generator and explain the operation of each in simple terms.
72. distinguish between coductors and insulators and give several examples of each.
73. explain the structure and function of a battery (dry or wet cell)
74. draw a simple electrical circuit which includes a power supply, a switch, an appliance and wire.
75. define ohm, volt, and ampere.
76. solve simple problems using Ohm's Law.
77. distinguish between parallel and series circuits.

MAGNETISM

78. discuss the law of magnetic poles.
79. draw the magnetic field of a typical bar magnet.
80. differentiate between the magnetic forces of attraction and repulsion.
81. draw a diagram representing the magnetic field of the earth.

ELECTROMAGNETISM

82. make an electromagnet if given an insulated wire, iron rod, and dry cell and demonstrate its ability to attract iron objects.
83. name several uses of electromagnets (e.g.: electric bell, electric motor, generator, telephone, etc.)

ELECTRONICS

84. describe how radio waves are broadcast.
85. distinguish between AM and FM radio.
86. describe the basic operation of a microcomputer.
87. describe how a transitor works.
88. distinguish between solid state and vacuum tube electronic systems.
89. describe the basic operation of television and radio.

SOUND ENERGY

90. describe how sounds are produced, transmitted, amplified, measured, and sensed.
91. describe the relationship between the speed of sound and the nature of the medium it is traveling through.
92. define the following characteristics of sound waves: pitch, amplitude, frequency and wavelength.
93. distinguish between the characteristic wave patterns for noise and regular sounds (e.g.: music).
94. explain how an echo is created.

HEAT ENERGY

95. explain the relationship between molecular motion and heat.
96. explain the difference between temperature and heat.
97. explain the relationship between the quantity of material and the heat content of the substance.
98. explain the phase change associated with the melting point and the boiling point of a substance.
99. substantiate that chemical reactions are accompanied by energy changes.
100. describe heat as a form of energy.
101. explain how heat causes matter to expand and contract.
102. explain how heat is transferred by conduction, convection, and radiation.
103. relate the concept of heat transfer to the present energy crisis.

LIGHT ENERGY

104. discuss electromagnetic radiation.
105. make a sketch of a wave, indicate on the sketch the wavelength and amplitude, and explain what frequency is.
106. describe the wave and particle nature of light.
107. distinguish between the reflection, absorption and refraction of light waves.
108. describe how a shadow is formed and the properties of the shadow.
109. describe the effect of concave, convex and plane mirrors on the reflection of light and the formation of images.
110. describe the properties of convex and concave lenses and their affect on image formation.
111. describe how a prism affects white light that passes through it.
112. name several uses of the ability of white light to break down into the colors of the spectrum.
113. describe the visible spectrum.
114. explain how lenses and mirrors are used in cameras, eyeglasses, contact lenses, microscopes, and telescopes.

FORCES AND MOVING BODIES

115. define velocity (speed).
116. define acceleration.
117. list units used in measuring time.
118. define force, give examples of force, and calculate force.
119. define friction and give examples of its advantages and disadvantages.
120. define inertia.
121. define momentum.
122. describe what is meant by the law of action and reaction.
123. explain how forces work to make possible air and space flight.
124. define gravity and discuss its relationship to mass and weight.

WORK AND MACHINES, POWER

125. answer questions about simple machines given diagrams and pertinent data.
126. define work and do simple problems involving work.

127. measure power--i.e. horsepower, mechanical and electrical efficiency.
128. name the major simple machines and give a common example for each.
129. demonstrate how all machines are derived from simple machines.

NUCLEAR ENERGY

130. define radioactivity.
131. name several important radioactive elements.
132. define what is meant by "half-life" of a radioactive substance.
133. describe and distinguish between nuclear fission and fusion.
134. describe what is meant by a chain reaction.
135. describe the basic structure and function of nuclear power reactors.
136. list several uses, advantages and disadvantages of nuclear energy.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure
NC - No Credit
P - Pass
F - Fail
WF - Withdrew Failing
WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: TRADITIONAL CHEMISTRY

CREDITS: 6
DATE: 6/83

In order to receive credit for the above subject the student must demonstrate mastery of 60% of the following proficiencies. Each proficiency should be read as "The student should be able to.....".

1. make measurements in metric units.
2. convert numbers to scientific notation.
3. apply significant digit rules to calculations.
4. use the factor label method to convert units and make calculations.
5. use the chemical nomenclature rules to write chemical formulas and balanced chemical reactions.
6. make calculations and conversions between moles, molecules, and mass.
7. explain the major stoichiometric concepts and apply these concepts in calculations.
8. diagram and/or construct models of the atom.
9. explain the locational patterns for the electrons within the atom and their importance to chemical behavior.
10. identify and calculate energy relationships in atomic structure studies involving spectral lines and wave theory.
11. demonstrate bonding concepts and predict bonding patterns within molecules.
12. explain the properties of elements based on their position on the periodic chart.
13. discuss quantitatively the relationship between the energy content of matter and the phase exhibited by that matter.
14. calculate the amounts of energy needed to bring about phase changes and change temperature.
15. explain the gas law concepts and make calculations relating volume, pressure, temperature, and stoichiometry of gases.
16. define the vocabulary and explain the concepts related to solutions.
17. perform calculations involving molarity, normality, and molality.
18. apply the concepts of chemical kinetics and equilibrium to the law of mass action and predict equilibrium shifts.
19. explain the acid-base definitions and the concept of neutralization.
20. apply the concepts of reduction-oxidation to balancing equations, identifying half reactions and predicting spontaneous reactions.
21. predict voltages in electrochemical cells and apply the concept of electrochemical cells and electroplating.
22. perform calculations involving stoichiometry and amounts of electricity in electrochemical reactions.
23. write scientifically accurate laboratory reports.
24. explain the basic concepts of nuclear chemistry.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination (departmental)

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
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C - Average
D - Below Average
E - Failure
NC - No Credit
P - Pass
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WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: CHEM STUDY

CREDITS: 6
DATE: 6/83

In order to receive credit for the above subject the student must demonstrate a mastery level of 60% for each of the following proficiencies. Each proficiency should be read as "The student should be able to.....".

1. make measurements in metric units.
2. convert numbers to scientific notation.
3. apply significant digit rules to calculations.
4. use the factor label method to convert units and make calculations.
5. use the chemical nomenclature rules to write chemical formulas and balanced chemical reactions.
6. make calculations and conversions between moles, molecules, and mass.
7. explain the major stoichiometric concepts and apply these concepts in calculations.
8. diagram and/or construct models of the atom.
9. explain the locational patterns for the electrons within the atom and their importance to chemical behavior.
10. identify and calculate energy relationships in atomic structure studies involving spectral lines and wave theory.
11. demonstrate bonding concepts and predict bonding patterns within molecules.
12. explain the properties of elements based on their position on the periodic chart.
13. discuss quantitatively the relationship between the energy content of matter and the phase exhibited by that matter.
14. calculate the amounts of energy needed to bring about phase changes and change temperature.
15. explain the gas law concepts and make calculations relating volume, pressure, temperature, and stoichiometry of gases.
16. define the vocabulary and explain the concepts related to solutions.
17. perform calculations involving molarity, normality, and molality.
18. apply the concepts of chemical kinetics and equilibrium to the law of mass action and predict equilibrium shifts.
19. explain the acid-base definitions and the concept of neutralization.
20. apply the concepts of reduction-oxidation to balancing equations, identifying half reactions and predicting spontaneous reactions.
21. predict voltages in electrochemical cells and apply the concept of electrochemical cells and electroplating.
22. perform calculations involving stoichiometry and amounts of electricity in electrochemical reactions.
23. explain the basic concepts of nuclear chemistry.
24. write scientifically accurate laboratory reports.
25. demonstrate an understanding of the experimental and investigative nature of chemistry.

26. solve problems and conduct investigative laboratory experiments independent of the instructor.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination (departmental)

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

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SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: Organic Chemistry

CREDITS: 3
DATE: 7/83

In order to receive credit for the above subject, the student must demonstrate a mastery level of 60% for each of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

1. explain the basic organic chemical nomenclature with regard to the following organic functional groups:
   alkanes, ackenes, alkynes, arenes, alcohols, aldehydes, ketones, ethers, esters, carboxylic acids.
2. discuss the structure of the organic functions mentioned in number 1.
3. represent organic molecules with structural formulas and three dimensional models.
4. represent organic chemical changes with balanced chemical equations.
5. explain the basic organic chemical classifications and their general properties and reactions.
6. explain the inter-relationships which exist between the organic functional groups.
7. synthesize several organic chemicals.
8. investigate practical uses of organic chemicals.
9. develop laboratory techniques unique to the study of organic chemistry.
10. write scientifically accurate laboratory reports.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure
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P - Pass
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WF - Withdrew Failing
WP - Withdrew Passing

SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: A.P. Chemistry

CREDITS: 3
DATE: 7/83

In order to receive credit for the above subject, the student must demonstrate a mastery level of 60% for each of the following proficiencies. Each proficiency should be read as "The student should be able to .....".

1. successfully perform laboratory experiments and write scientifically accurate laboratory reports involving the structure of matter through the study of:

   a. the Theory of Atomic Structure.
   b. spectroscopy and electron energy levels.
   c. periodic relationships among the atoms.
   d. bonding forces--intramolecular and intermolecular.
   e. molecular shape and polarity.
   f. physical and conceptual models.
   g. nuclear activity.

2. successfully perform laboratory experiments and write scientifically accurate laboratory reports involving the states of matter through the study of:

   a. the laws of ideal gases and the kinetic molecular theory.
   b. the behavior of liquids and solids.
   c. solutions.

3. successfully perform laboratory experiments and write scientifically accurate laboratory reports involving chemical reactions and chemical changes through the study of:

   a. reaction types.
   b. chemical equations.
   c. chemical equilibrium.
   d. chemical kinetics.
   e. chemical thermodynamics.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

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SCIENCE DEPARTMENT
MOORESTOWN HIGH SCHOOL
SUBJECT PROFICIENCY REQUIREMENTS

SUBJECT: PHYSICS

CREDITS: 6
DATE: 4/83

In order to receive credit for the above subject, the student must demonstrate mastery of 60% of the following proficiencies.

STUDENTS MUST BE ABLE TO PERFORM LABORATORY EXPERIMENTS AND SOLVE PROBLEMS CONCERNING:

1. STATICS

   the resolution of forces and composition of forces in equilibrium situations with and without frictional effects.

2. LINEAR MOTION

   Newton's laws of motion including displacement, velocity, and acceleration as variables.

3. CURVILINEAR and ROTARY MOTION

   two dimensional motion as well as angular motion.

4. CONSERVATION of ENERGY

   potential and kinetic energy and the conservation of total energy.

5. MOMENTUM

   conservation of momentum within collisions and explosions.

6. HEAT

   the law of heat exchange and changes of phase of matter.

7. THERMAL EFFECTS

   the mechanical equivalent of heat and the first and second laws of thermodynamics.

8. WAVES

   water and sound waves including their propagation, reflection, refraction, and diffraction.

9. LIGHT

   the reflection, refraction, diffraction and polarization of light.

10. ELECTROSTATICS

electric charge and potential difference.

11. DIRECT CURRENT CIRCUITS

series and parallel circuits and Ohm's Law.

12. MAGNETISM

magnetic fields, electromagnetism and D.C. meters.

THE STUDENTS MUST ALSO BE ABLE TO DO THE FOLLOWING:

1. use laboratory equipment in a safe and constructive manner.

2. apply mathematics from the areas of algebra, plane geometry, and trigonometry in problem solving in the form of:

   a. drawing graphs and interpreting them.
   b. solving linear, quadratic and trigometric equations.
   c. using principles of plane geometry.

EVALUATION PROCEDURES: Students' grades will be determined by the following:

1. Quizzes
2. Tests
3. Homework (readings & written)
4. Laboratory work
5. Laboratory reports/notebook
6. Written and/or oral reports
7. Classroom participation
8. Notebook
9. Projects
10. Final examination

EVALUATION OF CLASSWORK:

A student's classwork is a basic determinant in grades assigned. This includes the quality and quantity of such factors as verbal and physical participation, preparedness, attentiveness, conduct, and attendance, as each contributes to the individual's progress within the classroom. Students are expected to attend ALL classes. Excessive absences of any kind will certainly be reflected in the "class participation" portion of a student's marking period grade. (Refer to "Excessive Absences" in the Student-Parent Handbook).

ACHIEVEMENT RATINGS: Student achievement shall be rated by letters with the following significance:

A - High Achievement
B - Above Average
C - Average
D - Below Average
E - Failure

NC - No Credit
P - Pass
F - Fail
WF - Withdrew Failing
WP - Withdrew Passing